Sydney WATER

Best practice guidelines for water efficiency in clubs

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Message from the Managing Director

Thanks for taking the time to read these guidelines.

They have been prepared to help club managers demonstrate that water efficiency is both environmentally and financially sustainable.

Sydney Water's Every Drop Counts (EDC) team has called on the expertise of managers from a number of clubs who are EDC Business partners. With their help, we hope to show you how clubs achieve sustainable water savings and also save money.

Water efficiency is just one part of the long-term strategy for Sydney Water. There are four main components of the NSW Government's plan to secure our water for life: dams, recycling, desalination and water efficiency.

With highly variable rainfall in the catchments and a steadily growing urban population, Sydney can no longer rely only on dam water storages. More diverse water supply options ensures that we have enough water for businesses and the more than four million residents of Sydney, the Illawarra and Blue Mountains.

Sydney Water is building a desalination plant, increasing the amount of wastewater recycled and continuing to help households and businesses use water efficiently.

Businesses across Sydney are already saving water and energy in response to community expectations. The EDC Business Program has helped businesses across Sydney save millions of litres of water while reducing their operating costs.

The hospitality sector accounts for 14% of business water use in Sydney (or nearly 52 million litres a day). This includes water used by clubs, hotels, restaurants and cafes. This is the same amount of water used by more than 100,000 households every year.

About five years ago Sydney Water released its first *Best Practice Guidelines for clubs*. Since then, the EDC team has worked with many clubs to learn more about water use in the industry. These revised guidelines include new benchmarks to compare your water use with other clubs. They also include real life case studies that show how new water efficient technologies can help you save water and money in your business.

There are also ideas and information on alternative water supplies. The guidelines will help you decide whether rainwater tanks and recycling water are an option for your club.

I hope you find the ***Best practice guidelines for water efficiency in clubs*** to be a practical resource to improve your water efficiency.

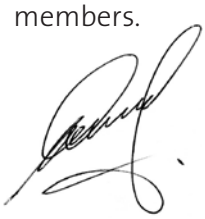
Kerry Schott
Managing Director
Sydney Water

Message from ClubsNSW

Community concern for the environment has grown in recent years, especially around climate change and water supply. I've seen a real shift in attitude when it comes to these issues and ClubsNSW considers environmental sustainability a key issue for our member clubs.

As the peak body representing clubs in NSW, we are proud to support Sydney Water to produce these ***Best practice guidelines for water efficiency in clubs***. I trust you will find these guidelines a practical and informative tool that outlines cost effective measures to help all clubs, no matter their size and location, use water efficiently.

I'm encouraged by the rapid and positive response from so many of our clubs. Some have already completed major projects to capture rainwater or manage their water more efficiently, while others are just beginning. I think, almost all clubs have seen some commercial benefit from early action, either from cost savings or from a better standing in the community and in the eyes of their members.



David Costello
Chief Executive Officer
ClubsNSW

Acknowledgements

Sydney Water thanks the following people and organisations for helping to develop the ***Best practice guidelines for water efficiency in clubs*** and for their critical and constructive reviews of the document:

- The Hydraulic and Water Savings section of the NSW Department of Commerce
- ClubsNSW
- NSW Department of Environment, Climate Change and Water (formerly NSW Department of Environment and Climate Change)
- Energy Australia Pty Ltd
- NSW Office of Water (formerly NSW Department of Water and Energy)
- URS Corporation
- NSW Department of Health
- Minus 40 Pty Ltd.

Specific individuals gave critical review and help:

- Mathew Greene, Paynter Dixon
- Mark Gjerek, NSW Department of Environment, Climate Change and Water (formerly NSW Department of Environment and Climate Change)
- Robert Quinn, National Project Consultants
- Andrew Porter, URS Corporation
- Shelley Gallacher, Sydney Water
- Anne Fitzgerald, ClubsNSW
- Brett Lake – Chief Steward Hilton Hotel, and Secretary AHWA.

Thanks to all clubs and companies who agreed to be case studies.

Contents

List of figures

List of tables


161

Part 1

Understanding your water use

Part 1 of ***Best practice guidelines for water efficiency in clubs*** presents benchmarks for water use in clubs and information to help you manage your water better.

Chapter 1

Why use water efficiently in your club?

These guidelines provide information to help you be water efficient. But why should your club be interested?

It saves you money

If you use less water you pay less in water, sewerage and trade wastewater charges. By using less water, you heat, pump and treat less water. This allows you to save energy and chemicals. Over time, it enables you to buy smaller pumps and hot water heaters, cutting capital costs.

It shows you share community values

A proactive approach to water efficiency will show that your club shares community expectations about water management. Benchmarking studies by Sydney Water show that many clubs can implement water efficiency projects that will pay for themselves in less than two years. Many clubs have already saved water by methods ranging from simply managing water better, to capturing and reusing rainwater.

Saving water today means it is available tomorrow

Long-term changes to rainfall, population growth and climate change will reduce the amount of water available from our catchments. Being more water efficient means we can run our businesses and still have water available for tomorrow.

Businesses that manage water well are better businesses

Managing water better means improving communications, record keeping, staff accountability and decision-making processes. These improvements flow to other aspects of your business and can make it more efficient and flexible. The business sector has reduced water use by 15% on average over the last five years. How have you performed?

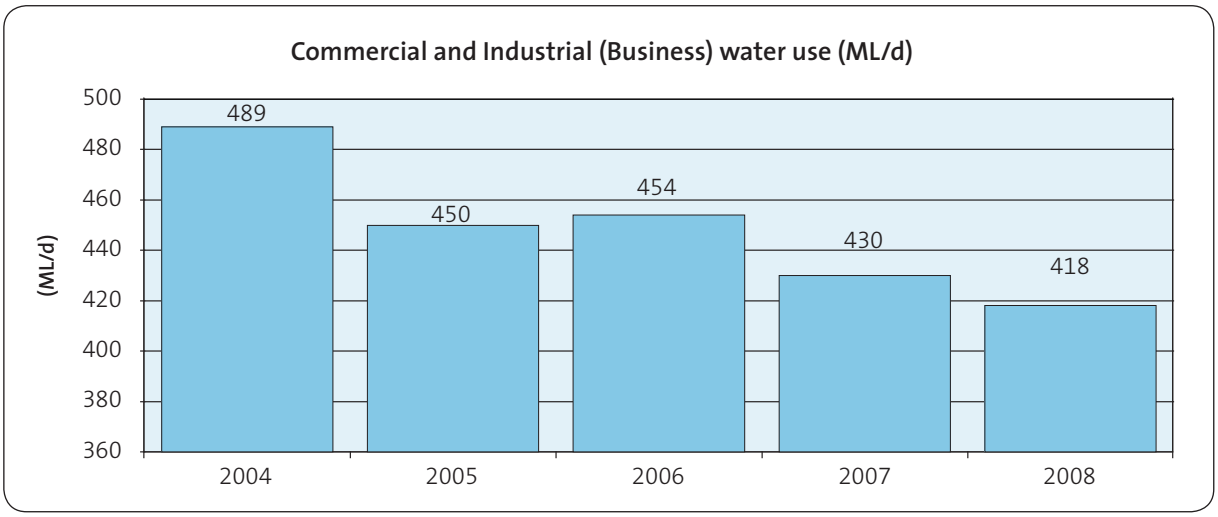


Figure 1 – How the business sector has saved water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Chapter 2

A snapshot of clubs in NSW

Registered clubs are a major business in NSW. Research conducted by ClubsNSW shows there are almost 1,500 registered clubs in NSW, with yearly revenues of $4.6 billion.

Clubs are popular with the community. Nearly 70% of adults in NSW are members of at least one club. Club memberships vary from six to 110,000 people. In 2006, 3.5 million people held at least one club membership, an increase of almost 10% since 2004.

The number of people employed by clubs has also increased. Clubs employ nearly 27,000 full time staff with a further 52,000 part-time, casual, apprentice or trainee staff. Clubs also rely on volunteers to provide services to members. In 2004, over 52,000 volunteers worked for clubs. They averaged 106 hours a year, in positions as diverse as club directors to coaching non-professional sports teams.

The most common types of clubs in NSW are:

- bowling clubs (33%)
- RSL and ex-servicemen's clubs (25%)
- golf clubs (13%).

In the greater Sydney region, 89% of clubs provide sports facilities. These include:

- 1,621 bowling greens
- 102 gyms
- 325 sports fields
- 57 pools
- 338 golf courses.

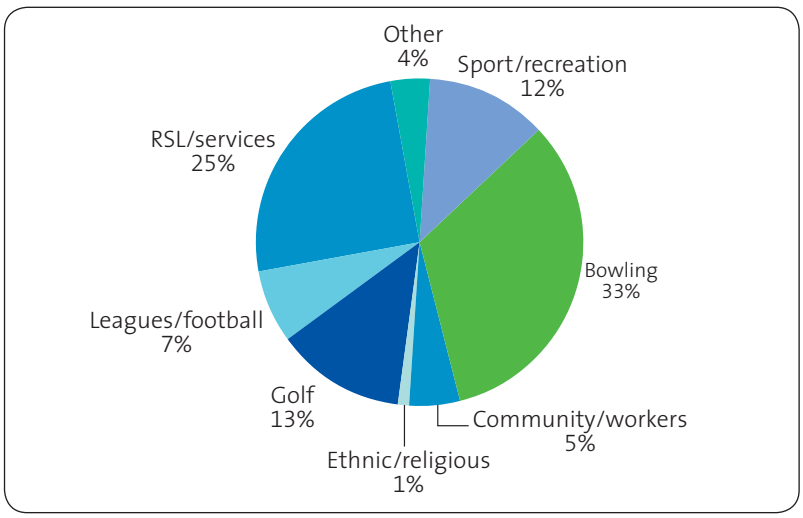

Figure 2 – The types of clubs in NSW (Allen Consulting Group, 2004)

Clubs can grow and still be water wise

The services clubs provide – such as sports facilities, restaurants and bars – can be water intensive. To grow sustainably, club owners must investigate and implement cost effective solutions to improve water efficiency.

This will save you money, ensure the viability of your club, and help secure water supply for future generations

Clubs can improve their water efficiency and expand sustainably through better management. This includes:

- detecting leaks and retrofitting existing amenities
- using sustainable building design
- using alternative sources of water.

These measures are outlined in the following chapters.

References

The Allen Consulting Group, *Socio-Economic Impact Study of Clubs in NSW*, 2004

Australian Bureau of Statistics (ABS), 8687.0 – *Clubs, Pubs, Taverns and Bars*, Australia, 2004–05, 2006, viewed 10 October 2008, www.abs.gov.au/ausstats/abs@.nsf/mf/8687.0

Clubs NSW, *Response to the Independent Pricing and Regulatory Tribunal's review of the registered clubs industry in NSW – issues paper,* 2008, viewed 10 October 2008, www.ipart.nsw.gov.au/investigation_submissions.asp?industry=5%20&sector=15%20&inquiry=117

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Chapter 3

Water use benchmarks for clubs

Sydney Water's Every Drop Counts (EDC) Business Program has been helping clubs be water efficient since 2001.

Sydney Water data shows the hospitality sector accounts for 14% of business water use in Sydney, or nearly 52 million litres every day (Figure 3). This includes water used by clubs, hotels, restaurants and cafes. This is the same amount used by more than 100,000 households every year.

The information in this report is based on 30 water efficiency audits Sydney Water conducted on clubs in the Sydney region in 2004–05. Appendix 1 has more details on how the audits were conducted and how the data was analysed.

Leaks

Up to a third of water used in clubs is lost through leaks. Common places for water leaks are bathroom and kitchen taps, toilets and urinals. See Chapter 10 for information on how to manage leaks.

How does your club's water use compare?

The EDC Business Program has developed water use benchmarks using the water efficiency audits.

The benchmarks are shown in Table 1. They help you compare your club's water use with other clubs that have similar facilities.

If your water use for each customer is higher than best practice, you can probably make big gains by making water efficiency a business priority for your club.

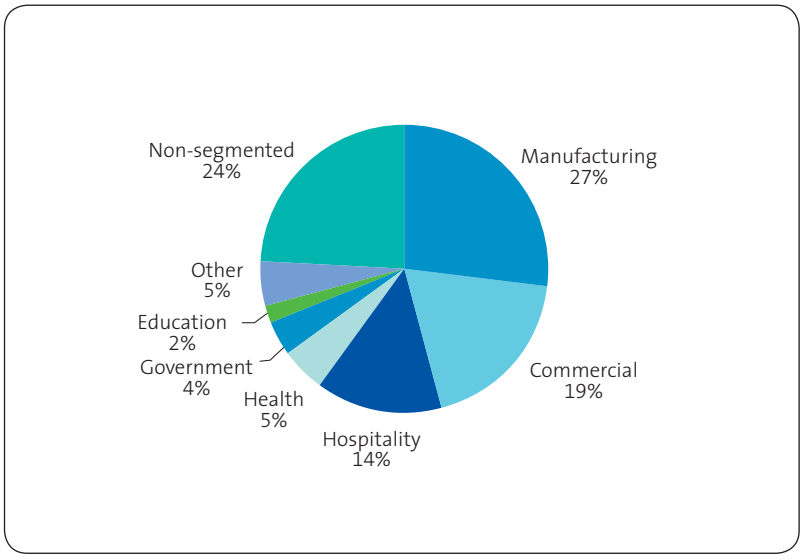

Figure 3 – Water used by the hospitality sector in Sydney in 2006 as a proportion of total business water use

Where is water used in your club?

The following charts can help you better understand where water is used in your club.

Clubs without swimming pools or cooling towers

Amenities and kitchens use the most water in these clubs, and account for 68% of water use. Chapters 11 and 12 explain how to reduce water use in amenities and kitchens.

Clubs with cooling towers (without swimming pools)

Cooling towers are a major water user for these clubs, accounting for up to 16% of their water use. Clubs with cooling towers were shown to have more leaks and base flow than clubs without cooling towers.

Improved monitoring and maintenance practices can improve cooling tower water use. Refer to Chapter 13 for more details.

Clubs with cooling towers and swimming pools

Swimming pools use an average of 13% of these clubs' water. Leaks and inefficient backwashing practices are common and increase the amount of water used in pools. See Chapter 14 for more information on how to operate swimming pools efficiently.

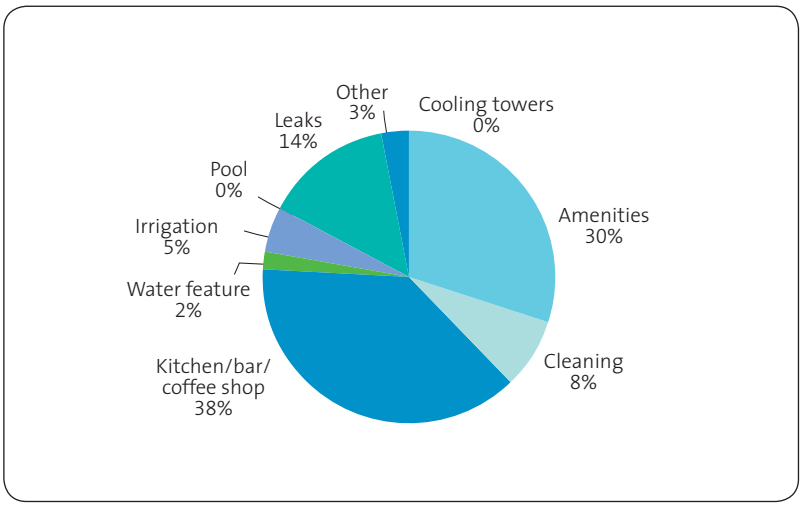

Figure 4 – Water use in clubs without swimming pools or cooling towers

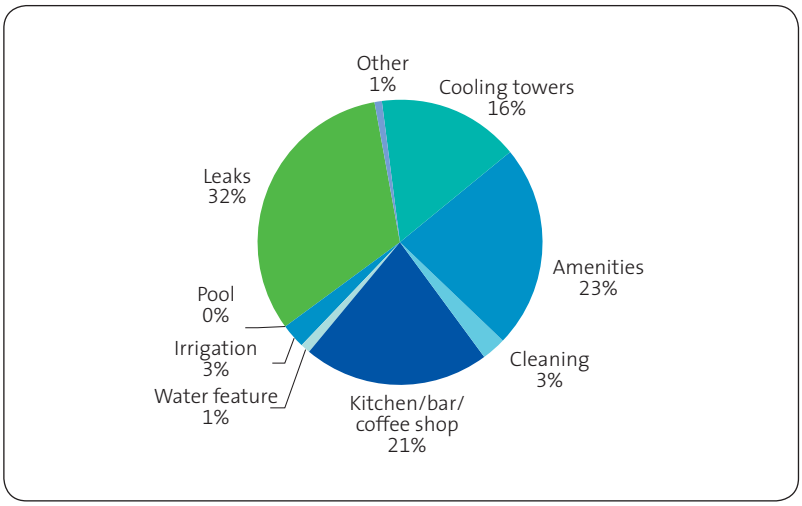

Figure 5 – Water use in clubs with cooling towers (without swimming pools)

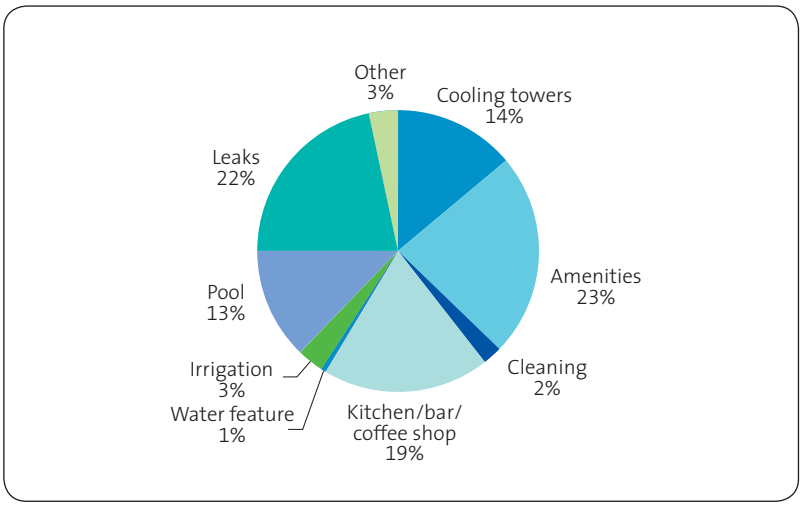

Figure 6 – Water use in clubs with swimming pools and cooling towers

Club facilities	Average L/customer/day	Best practice L/customer/day
No cooling tower or swimming pool	27	20
Cooling tower (no swimming pool)	35	22
Cooling tower and swimming pool	39	28

Table 1 – Efficient water use benchmarks for clubs

See Appendix 1 for more information on how the benchmarks were developed.

The EDC Business Program has worked with many clubs to reduce their water use. On average, clubs that have taken part in the program reduced their water use by 20%. Four clubs reduced their water use by more than 50%.

Clubs achieved a large part of the savings by repairing leaks, improving maintenance practices and installing water efficient equipment. The majority of work paid for itself in less than two years.

Case studies throughout these guidelines will show you how easy it can be to save water in your club using simple, cost effective equipment and practices.

Part 1 of these guidelines will help you manage your water more efficiently.

Part 2 contains lots of information to help you carry out water efficiency projects. If you are planning to renovate or rebuild your club, you can make sure that water efficiency is part of the design criteria. Chapter 18 will help you include water smart design into club building projects.

Part 3 of these guidelines contains information on using alternative water sources.

Part 4 of these guidelines is a water efficiency checklist. If you complete the checklist, it will help you develop a simple action plan for water efficiency in your club.


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Chapter 4

The true cost of water

Water supply charges are only the beginning of water related costs.

Sydney Water charges customers $1.87 for every kilolitre of water used. Water prices will rise in the future (see Figure 7). The Independent Pricing and Regulatory Tribunal (IPART) has approved price rises for Sydney Water until 2011–12. Details are available at sydneywater.com.au

The real cost of water to a business is more than the charges for the metered water supply. The real cost of water also includes the cost of wastewater and trade wastewater processing, and energy costs to pump and heat water.

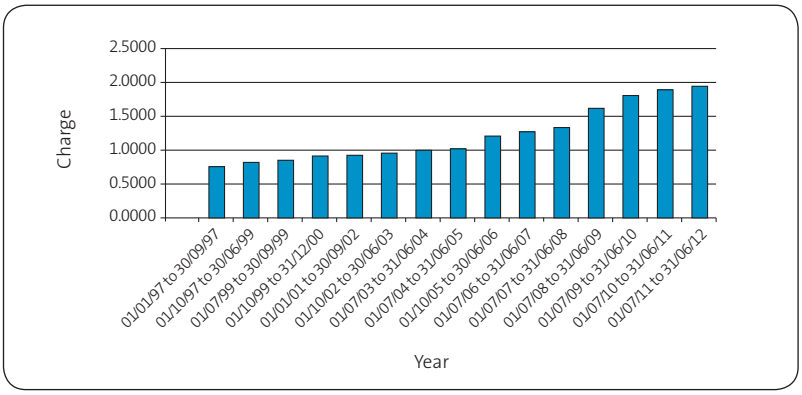

Figure 7 – Sydney Water's past and future water use charges

Water use charge	Cost/kL
Water	$1.87
Wastewater (in excess of 1.37 kL/day)	$1.42
Trade wastewater process charge	Process dependent, varies from $0.02/kL to $61.42/kL

Table 2 – Sydney Water charges 2009-2010

Check with your local supplier for charges if you are outside Sydney Water's area of operations.

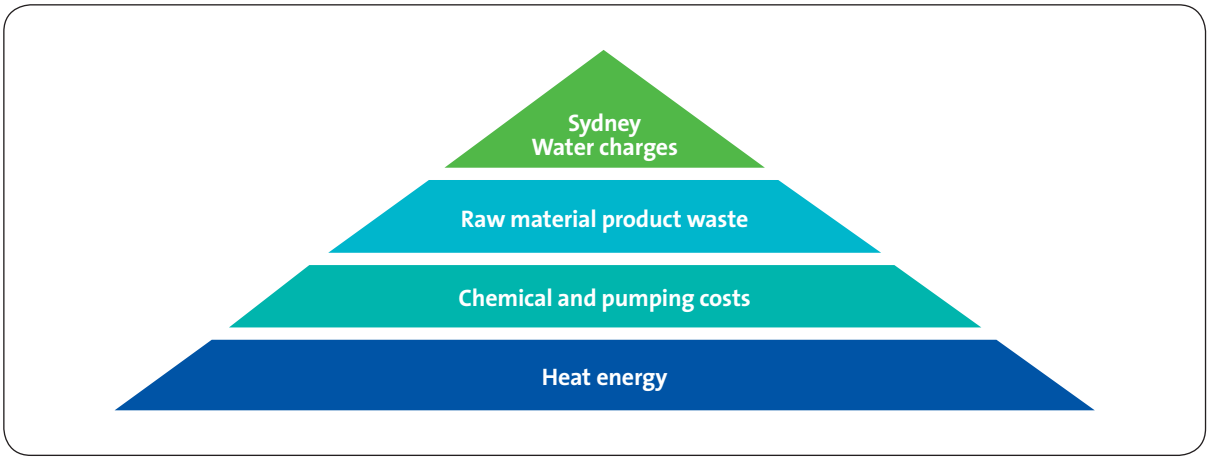

Figure 8 – The EDC Business Program's 'cost of water' diagram highlights some of the hidden costs of water

Wastewater charges

Businesses that discharge more than 500 kL of sewage a year, or 1.37 kL a day, are charged $1.42/kL to reflect the costs of treating and managing wastewater.

Sydney Water uses a Sewerage Usage Discharge Factor (SUDF) to calculate the amount of wastewater you dispose of to the sewer.

The SUDF is a measure of the ratio of water going out of your business through the sewerage system compared to water coming in from Sydney Water mains. The SUDF applied by Sydney Water will depend on your business type and the equipment you have installed.

Most clubs have a SUDF of 90–100% reflecting that 90–100% of water supplied is eventually discharged to the sewer.

Calculating your trade wastewater charges

Clubs that discharge trade wastewater, including greasy or oily wastes, are charged a trade wastewater quality charge by Sydney Water to cover the extra costs of treating this wastewater. Restaurants, cafes and club kitchens create oily and greasy wastes.

Bleed water from cooling towers may also be subject to a trade wastewater quality charge.

Visit sydneywater.com.au or call 13 20 92 to speak with a customer service representative for more information about trade wastewater charges.

If wastewater is not sub metered, trade wastewater charges are calculated on business indicators such as the number of restaurant seats or the number of function meals served a month. Sub metering trade wastewater discharges will enable a better assessment of trade wastewater amounts and may help you reduce your trade wastewater charges.

Case study

Calculating your total water costs

To calculate your sewer use charges, follow the steps in the example below.

A club with a 50 mm meter using 100 kL of water a day has a calculated SUDF of 95%. Its restaurant discharges 10 kL a day and is also subject to a trade wastewater quality charge of $1.23/kL.

Water cost 100 kL x $1.87/kL
= $187/day

Sewerage charge
((100 kL x .95) –1.37) x $1.42
= $133.24/day

Trade wastewater charge*
10 kL x $1.23 = $12.30/day

Total charges are $332.50 a day or $121,360.90 a year.

*Charges dependent on food processes and location.

Additional fees include:

- water service charge (based on water meter size): $158.65 a quarter or $634.60 a year
- sewerage service charge (based on water meter size multiplied by SUDF): $743.80 a quarter or $2975.32 a year
- trade wastewater quarterly application fee: $19.86 for the first trade wastewater process and $6.61 for every additional process
- Wastesafe (grease trap) processing fee: $0.134/L.

Sydney Water's 'Wastesafe' system ensures the safe collection, transportation and disposal of grease trap waste from all customers with a trade wastewater agreement. Grease trap contractors bill customers for collecting and transporting grease trap waste. Sydney Water bills customers directly when waste is processed at a Wastesafe depot.

Find a full list of water and wastewater charges at sydneywater.com.au

Meter size and service charges

Water and sewerage service charges are based on the width of your club's water meter. If you cut your water use, it may be worth investigating resizing your meter to reduce water and sewerage charges. This may interest clubs that are planning recycled water or sewer mining projects.

Before resizing, you will need to consider your club's plans for additional buildings or extensions that might increase future water use.

If you need to resize your meter, call Sydney Water on 13 20 92.

Responding to future water costs

Water prices in Sydney and other cities will increase in the future. Other business costs such as energy, transport and environmental compliance are also likely to increase.

Businesses that are already water efficient will avoid many increased charges, while higher costs will create greater incentives for others to improve their water efficiency.

Chapter 5

Managing your water more effectively

The Every Drop Counts (EDC) Business Program shows that improved water management is the key to sustainable water efficiency.

Technical projects may reduce water use in the short-term, but managing water better is the only way to maintain water efficiency.

7-point plan for water efficiency

The EDC Business Program has a 7-point plan to structure and prioritise your club's water efficiency program.

1. Seek commitment and leadership from senior management

Commitment and leadership from senior management is essential to ensure a successful water efficiency program. To achieve real results, management must take the lead in water efficiency and set an example for their staff.

Managers need to encourage change in business processes and behaviours to achieve sustainable water savings. A good example is to ask purchasing officers or staff to consider life cycle costs before buying. When taking into account maintenance, water and energy costs over the life of the item, the lowest priced unit may not always be the cheapest.

2. Appoint a water efficiency manager

Organisations that appoint a person to manage water efficiency achieve the best results. The person should have dedicated responsibility for water efficiency, although this does not need to be their sole task.

3. Understand your systems to find out where your club is using water

Determine where, when and how water is used in your club. Audit water use, undertake an inventory of all water-using equipment, and develop a balance between the water that enters and leaves your club. This will enable you to identify the opportunities for water savings and focus your attention on the largest uses. Chapter 8 will help you conduct a successful water audit.

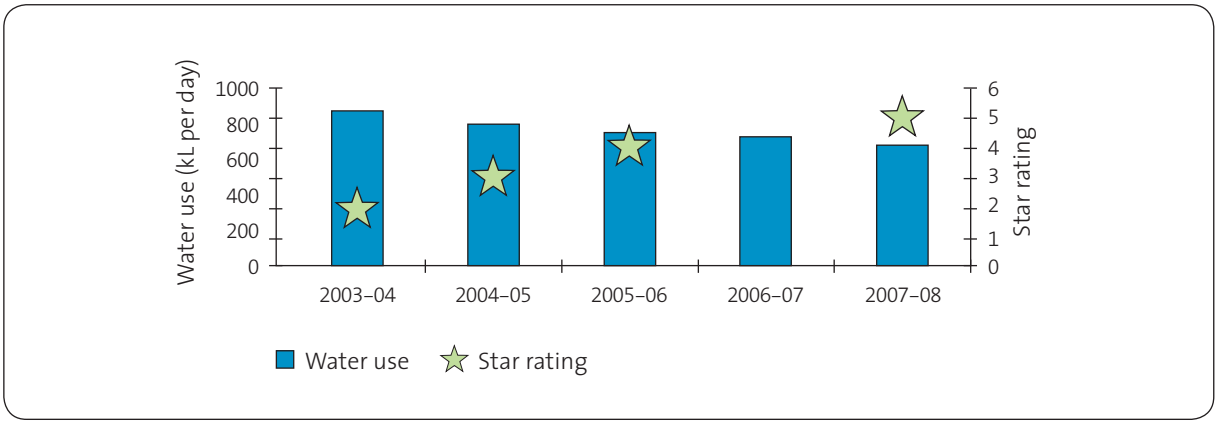

Figure 9 – Macquarie Asset Solutions water use has fallen as water management has improved, measured by the One-2-Five® Water diagnostic.

Identify and quantify the hidden costs of water.

Water costs are more than just supply and sewer charges. Saving water can lead to reductions in electricity, gas, labour and chemical costs and the identification of redundant water-using equipment.

4. Identify opportunities to save water

Think laterally. Some of the simplest ideas may be the most cost effective. Water efficiency is not just about large-scale technical solutions. Small changes can make a big difference. Ensure that staff have the opportunity to suggest water saving ideas.

5. Set a realistic goal

It is important to have realistic water efficiency targets so that everyone can measure the gains. Businesses that use a water audit can typically identify yearly savings targets of 20% or more. Another way to set a target is to benchmark against key indicators such as kL a customer. Chapter 3 outlines benchmarks for different types of clubs.

6. Develop a water efficiency strategy

A water efficiency strategy should work through the following principles:

Avoid

Avoid using water where possible. Repairing leaks is the most cost effective way to minimise water use.

Reduce

Reduce the amount of water used. Reduce the flow through taps and add spray nozzles to the end of cleaning hoses. Replace inefficient amenities with new, efficient models.

Reuse

If you cannot reduce the amount of water being used in a process, try to use water more than once.

Recycle

Recycling water is an alternative where health guidelines allow. For example, treating wastewater to use for irrigation.

7. Involve staff and customers

Behavioural change is also essential if water savings are to be maintained.

Think of innovative ways to engage staff in water efficiency. Ensure staff can offer ideas and take part in water efficiency initiatives. Increase staff and customer water efficiency awareness through management reporting, signs around the club and newsletters. Competitions can also be a good way to increase awareness.

The EDC Business Program's 7-point plan will achieve long-term sustainable water use, saving money, water and the environment. Conducting a yearly assessment will keep you on track and identify further improvements in water management. Results from the EDC Business Program's

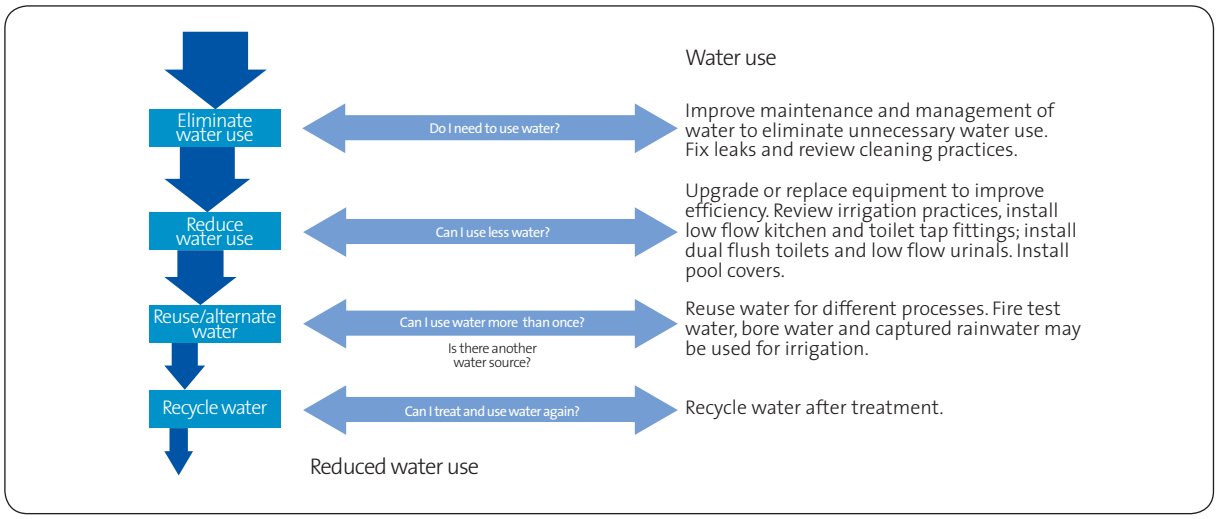

Figure 10 – Water management hierarchy

One-2-Five® Water diagnostic show that as organisations improve their water management, water use falls.

Water management plan

We recommend you follow the 7-point plan when organising any water efficiency work to prevent unnecessary costs. For example, this year you may plan to install a rainwater tank for your toilets and urinals. If you were to replace these in the future with dual flush toilets and low flush urinals, the tank and pump would be oversized.

By following the logic in Figure 10, you will save money in the long-term by ensuring any reuse or recycling systems are properly sized.

Water management tools

EDC Online

EDC Online is a new secure website to help Sydney Water business customers track, report and organise their water information. It can help you:

- set priorities for water management
- track water use after projects have been implemented
- monitor water use.

Key features include:

- up-to-date water use data for business customers (based on billing frequency)
- automated graphical reports to help you interpret trends in water use for all sites, each individual site and each billing meter
- ability to produce water use figures benchmarked against business specific key performance indicators
- access to meter reading data that can be downloaded for analysis
- a location for your important EDC Business Program and water management documents.

For access to EDC Online, Sydney Water business customers can register at sydneywater.com.au

Management diagnostics

To help companies achieve better long-term water management, the EDC Business Program runs management diagnostics for customers.

A management diagnostic assesses the non-technical measures that all businesses need to address to achieve sound water management. The process examines and makes recommendations on:

- demonstrating corporate commitment and leadership
- understanding water use performance and opportunities
- planning water use targets, key performance indicators and identifying people with water management responsibility and accountability
- improving operational and maintenance practices
- managing supply and legal compliance
- incorporating water into financial management
- using technology and innovation
- reporting measurement verification.

Figure 11 – A snapshot of the EDC Online program

Types of management diagnostic tools available

One-2-Five® Water

The One-2-Five® Water diagnostic is a key part of the EDC Business Program. It helps businesses measure improvements in their water management and compares their performance with other organisations. It is specifically designed for corporations that have multiple divisions or sites with complex management structures and use more than 80 kL of water a day.

Water Achiever®

The Water Achiever® management diagnostic is designed for businesses such as clubs.

It uses a traffic light rating system to measure a company's performance in water management. The ratings are:

Red – your club has started managing water, wastewater and reducing obvious water waste.

Amber – your club has made substantial progress in developing processes for managing water and wastewater.

Green – your club has developed formal and effective systems for managing water and wastewater.

How does the Water Achiever® management diagnostic work?

Water Achiever® sessions are self-assessed workshops facilitated by EDC Water Efficiency Specialists. They help clubs assess their performance in essential aspects of water management.

A typical Water Achiever® session takes up to an hour. A cross-section of staff should attend. These might include sustainability officers, cleaning, kitchen and bar staff, engineering and maintenance managers and accounting and purchasing staff. The Water Achiever® diagnostic will give:

- an assessment of the club's water management practices that can be used to benchmark performance against similar clubs
- a list of the barriers to improved water management
- an action plan that includes accountabilities and milestones.

Water Achiever® sessions are free for EDC Business Program customers.

You can also complete the easy checklist in Part 4. The checklist will give you practical actions for improved water management and help you complete a technical review of your water use.

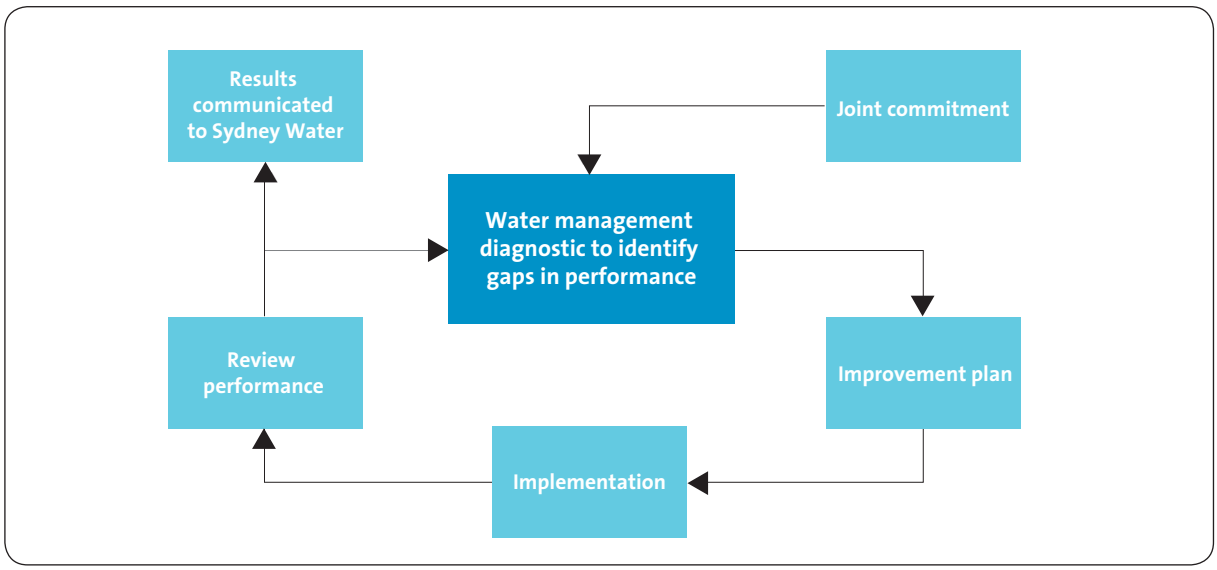

Figure 12 – The EDC Business Program process for helping customers save water, money and the environment

Case study
Water Achiever® at Mounties

Mounties began their Water Achiever® journey when they joined the EDC Business Program in 2004. In just two years, they put in place a range of water efficiency projects. They progressed from a 'red light' to a 'green light' and saved over 100 kL a day.

'Sydney Water's management diagnostic process helped Mounties identify facets of managing water that may not be easily recognised,' Michael Pugsley, Facilities Manager of the Mt Pritchard based club said.

The Water Achiever® process gave Mounties a simple and cost effective action plan to achieve sustainable water savings. Some of the projects implemented by Mounties include:

- regularly monitoring water use data. Mounties installed a wireless meter reading system that gives daily meter readings via SMS so they can track water use
- setting and reviewing water use benchmarks
- tenants are sub metered and billed for their direct water use, encouraging them to use water efficiently
- ensuring water efficiency is considered when renovating and/or buying new equipment. For example, recent renovations include dual flush toilets, smaller cisterns, low flow tap heads, sensor taps and urinals
- discussing water efficiency at staff inductions to promote a water efficient culture.

Chapter 6

Sustainability and funding opportunities

Calculating the true cost of water in your club can help build a strong business case for making your club water efficient.

Many water efficiency projects are more cost effective than first expected if water, wastewater discharge and other operating costs are considered.

Many of the most effective water efficiency projects have short paybacks (from several months to three years), making them excellent candidates for internal funding.

A general rule for prioritising water efficiency projects is: avoid, reduce, reuse and recycle.

Sometimes it can be difficult internally to fund an expensive or technically advanced water efficiency project. If you need financial support for water efficiency projects there are funding programs available. Some of these are listed below.

Smart Rinse Program

The Smart Rinse Program can help clubs, cafés, bars, restaurants and take away food shops use water efficiently.

Sydney Water's Smart Rinse Program offers free replacement of pre rinse spray valves with a water efficient Smart Rinse valve. Pre rinse spray valves are used to remove food scraps and grease from plates before they go in the dishwasher. Smart Rinse valves use about 40% less water than conventional valves. As most pre rinse spray valves use hot water, the program will help cut your energy bills too.

Call 1800 622 695 between 8.30 am and 5.00 pm Monday to Friday to book an installation. The program will run until 2011.

Waterless wok subsidy

Installing a waterless wok can save a busy Asian style restaurant about five kilolitres of water a day. The Ethnic Communities Council (ECC) is offering subsidies and educational assistance for businesses in Sydney and the Central Coast if they install waterless woks. If you would like a waterless wok for your restaurant email wok@eccnsw.org.au Chapter 11 has more details about waterless woks.

Climate Change Fund

In July 2007, the NSW Government launched a five-year, $340 million program to fund energy and water efficiency projects. NSW Climate Change Fund programs include:

- $30 million NSW Green Business Program for projects that will save water and energy in business operations in NSW
- $30 million Public Facilities Program for energy and water saving projects in schools, community buildings, sports facilities, museums and art galleries
- a rainwater tank rebate up to a maximum of $1,500. In Sydney Water's area of operations, the rebate is available to residential, commercial and industrial customers
- $20 million Rainwater Tanks in Schools Program.

For more information visit www.environment.nsw.gov.au/grants/ccfund.htm

EcoClubs

The Department of Environment and Climate Change NSW (DECC) and ClubsNSW have created the EcoClubs program to help clubs become more sustainable.

EcoClubs subsidises the cost of a basic environmental audit to identify ways your club can become more sustainable. The program gives clubs information about:

- sustainable approaches to club refurbishment
- liquid and chemicals management
- supply chain opportunities
- sports ground maintenance
- climate change strategies.

Improving the sustainability of your club's operations can cut costs, reduce business and environmental risks, improve your club's image and make it easier to attract and retain staff. For more information email sustainbus@environment.nsw.gov.au

Rainwater tank rebate

Sydney Water offers a rebate of up to $1,500 to business and residential customers who install a rainwater tank. To be eligible for the maximum rebate, you must install a tank of seven kilolitres or more and connect it to toilets and a washing machine. For more information visit sydneywater.com.au

Chapter 7

Monitoring water use

Monitoring your water use regularly is the key to maintaining a successful water efficiency program.

It is almost impossible to save water if you don't know how much you are using, and where and when it is being used. Measuring these factors will help you find your best opportunities for water efficiency.

Monitoring – the key to identifying water efficiency

Monitoring water use helps you understand your water use patterns, and identify leaks and inefficient practices. Monitoring is the best way to identify leaks that could otherwise remain undetected, costing you unnecessary water and wastewater charges.

There are three main ways you can monitor your water use:

1. Manual meter reading.

2. Offline monitoring systems.

3. Online monitoring systems.

To get more detailed information from your monitoring, you can install sub meters on key water-using equipment. EDC Business Program customers may be eligible for discounts of up to 30% on sub meters.

Manual meter reading

Sydney Water reads business water meters every month at most. However, you can read your own meter more often – weekly or even daily.

To check if your club has leaks, take a meter reading at the close and start of the business day. If there is a difference between the two readings and there was little or no activity overnight, you may have a leak. Leaking amenities and cooling towers commonly cause overnight flow.

Offline monitoring systems

Installing an automatic monitoring system is a more efficient way to monitor water use and can keep track of multiple sub meters. Automatic monitoring systems monitor water use frequently – generally between every five and 15 minutes. This saves you time and readily identifies water use patterns and unusual water use.

Data loggers fitted to your sub meters collect information on water use. The data must be manually downloaded to a laptop regularly, so the data can be analysed.

These systems are relatively inexpensive and give good information. They are useful if you want to do spot checks on problem areas and initiate a system to rotate them around your club. Because data isn't relayed to your computer automatically, you'll need to download and analyse it. This can be time consuming and means it can still take some time to detect leaks.

EDC Business Program customers can get short-term access to an offline monitoring system, which uses monitoring devices called tiny tags.

Online monitoring

You can pay a company to install data loggers on sub meters and give the information to you. Some provide information immediately on the internet. They can also fit an alarm to alert you via email or SMS, if there are dramatic changes in water use or increases in base flow.

To establish an online monitoring system for your club, you will have to pay an upfront cost to set up the system, and a smaller yearly

service charge.
The cost will increase with the number of sub meters monitored and the complexity of your club building.

The costs to install and operate continuous online monitoring are generally offset by savings in water, equipment maintenance and upgrades.

Figure 13 – An online water monitoring tool is a valuable asset for good water management

Case study

Saving water at Warringah Mall

Warringah Mall is located on Sydney's northern beaches and is NSW's largest open-air shopping centre. The centre's managers installed a comprehensive monitoring system in May 2007.

Operations staff now check the system several times a day. Within two weeks of the system being installed, the staff identified a leak of 70 kL a day and quickly repaired it. This has saved Warringah Mall $57,400 a year – enough to operate the monitoring system for several years.

Using your building management system

You can use your existing building management system (BMS) to continually monitor water use. Talk to your current BMS supplier about connecting water meters to your BMS. The costs to upgrade your system will depend on the complexity of your hydraulics and club layout.

Using your BMS enables you to combine the monitoring of water, gas and electricity into a single system. This gives you a snapshot of current use, which you can compare to historical trends.

Installing sub meters

To get the most out of your monitoring program you need to install sub meters at key points in your club. Sub meters help you understand where and when water is being used. With this information, you can set the priorities for water efficiency actions.

You can prioritise sub meters in your club as follows:

Priority 1 - Amenities

Toilets and urinals can use large amounts of water. Monitoring amenities will identify leaks and measure the success of improved maintenance and cleaning procedures.

Priority 2 - Kitchens

Comparing water use in restaurant and bistro kitchens against the number of meals prepared helps you generate water use benchmarks, and identify leaks and inefficient practices. You can record and compare benchmarks in EDC Online.

Priority 3 - Cooling towers

Monitor the make-up water to your cooling tower to identify any leaks or overflow. Without monitoring, leaks and overflows can be easily missed.

Priority 4 – Swimming pools

Monitor the water that's added to your pools to make up for losses from splash, overflow and evaporation. This will help you detect problems with float valves that might be constantly letting water in to refill the pool, and unnecessary manual pool refilling by staff.

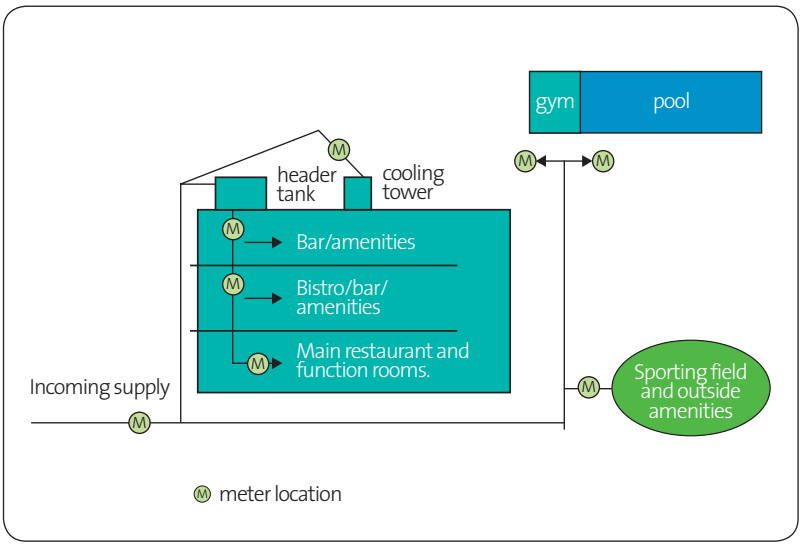

Figure 14 – A typical hydraulic system for a club

Priority 5 - Outdoor areas

Monitor the water supply to your irrigation system and water features. They may not be a large part of your club's water use but outside leaks can be easily missed.

Figure 15 shows a typical hydraulic system for a club, with suggested locations for sub meters. Once these sub meters are installed, an accurate water balance can be developed.

Water balance

A water balance is a measure of how much water is entering and leaving your club. Working out a water balance for your club will also help you understand where water is being used.

You can develop a water use balance using information from regularly monitored sub meters. The best way to show water use is to draw a diagram of your water system. The diagram should include amenities, kitchens and cooling towers, as well as any swimming pools, water features or irrigation systems.

Remember to include cooling tower losses from bleed, evaporation and drift. Graph this information in a pie chart to show how much water is used in different parts of the club.

Once you have calculated and graphed your water balance, it is easier to identify and prioritise your best opportunities for saving water.

Benefits of monitoring

Regularly monitoring your water use helps you manage water more efficiently. Graphing your water use data gives you a simple representation of how much water you are using and where you are using it. This makes it easier to identify patterns and changes. This means saving money by:

- spotting discrepancies in water use so you can quickly respond to leaks and equipment malfunctions
- collecting meaningful data on water use to justify water efficiency projects
- comparing energy and water use against KPIs in the club or specific sections of the club
- reducing energy and chemical use by preventing unnecessary water heating, pumping and treatment.

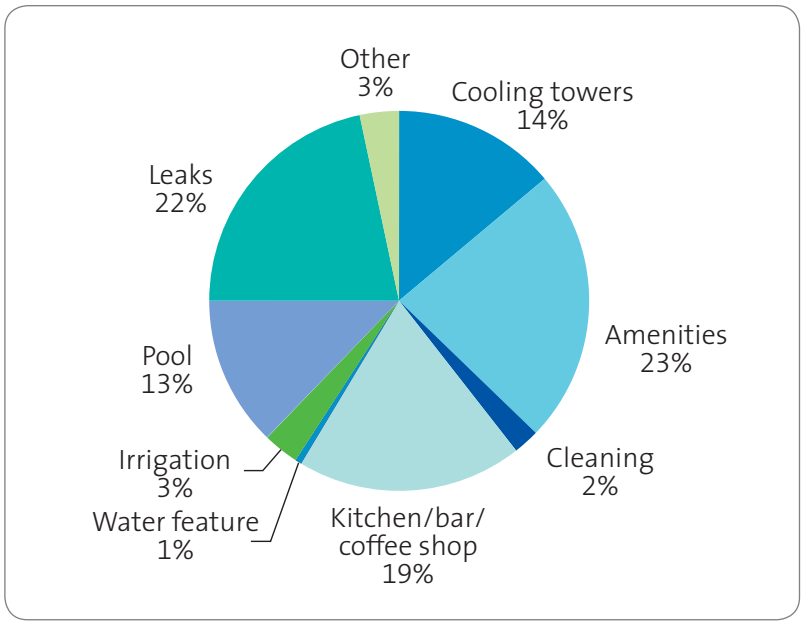

Figure 15 – A typical water balance for a club, shown in a pie chart


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Chapter 8

Water efficiency audits

A water efficiency audit helps you decide what water efficiency projects to focus on first. It is a vital step to establish a business case for water efficiency projects.

Key objectives of a water efficiency audit are to:

- identify water use patterns
- understand the water supply system
- identify deficiencies in the system, including leaks and waste
- identify water and energy efficiency opportunities, including water reuse
- develop water benchmarks and targets.

Follow these procedures to complete a comprehensive water efficiency audit of your club.

Planning and research	• Graph your historical water use. Is flow constant? Are there seasonal peaks? Can you explain any large peaks and troughs? If the graph is erratic, it may mean lots of leaks and poorly managed water use practices. What was the lowest monthly use and why? • Locate up-to-date hydraulic plans that identify water, wastewater and stormwater reticulation pipe networks. • List your water-using equipment. How old is the equipment and what is its expected water use? Do you have maintenance manuals? Is equipment being operated and maintained following the manufacturer's recommendations? Is more efficient equipment available? • Identify existing sub meters and determine locations for new sub meters (see Chapter 7). • Inspect access to the water pipe network, water services, existing meters, sub meters and tanks. Can you inspect pipes? Can you read the meters easily? • Think about your water efficiency priorities. Do you want to save water to cut costs, boost community approval, improve facilities, or meet environmental standards?

Collect and do	• Take overnight meter readings when the club is closed to identify if there are flows when facilities are not being used. • Install logging equipment on meters and sub meters. • Audit amenities and fixtures. Do flow tests to determine flow rates (use a bucket and a stop watch or a flow cup) and identify inefficient water fixtures. What is the flow from taps and showers? How many single flush toilets do you have? Do you have cyclic flushing urinals? Are sensors for urinal flushes operating effectively? Do you notice any leaks? • Review infrastructure. What is the opportunity for rainwater capture and reuse? • Is there an upcoming project where underground storage can be incorporated? • Do all downpipes feed to a few points so rainwater can be easily collected? Is stormwater collection possible? Are storage locations close to the point of use?
Review your operations	• Review cleaning and staff practices in the club. Do staff use hoses or pressure equipment to wash down areas? Do kitchen staff turn off taps? Are cleaners reporting leaking equipment? • Review equipment that operates automatically. Make sure cooling and heating systems aren't competing against each other. Is your pool filter being operated to manufacturer's specifications? • Review water use outside the building. Is vandalism a problem with taps being turned on? Are grounds staff and contractors following current water restrictions? What are their watering practices? How do they decide when to water? What is the condition of your turf and soil? • Check water-using equipment, such as glasswashers, to make sure they still operate efficiently. Are they being operated correctly? Measure the water use of equipment to see if it still meets manufacturer's specifications. How does it compare to best practice?
Calculate	• Calculate daily average customer numbers. Develop benchmarks for water use (eg kL/patron/day) and compare them to your targets or industry best practice. • Calculate your water costs for supply, discharge, treatment, pumping and heating. • Calculate hot water costs. • Calculate possible water savings and cost savings.

Action plan	• Develop a water use balance for your club. What uses the most water? • Identify your best water efficiency opportunities and prioritise them by simple payback or internal rate of return calculations. • Review water reuse or recycling opportunities. • Look at the checklist in Part 4 for advice on how to improve water management. • The EDC Business Program offers subsidised water efficiency audits for members that use more than 80kL/day.

Table 3 – Water review actions

Case study
Saving water at St Marys Leagues Club

St Marys Leagues Club has cut water use by 64% since August 2003.

Following a recommendation from their One-2-Five® Water management diagnostic, St Marys Leagues Club conducted a water efficiency audit.

The audit revealed the club's rainwater tank was not operating efficiently.

An inspection identified a faulty float valve was allowing mains drinking water to constantly fill the tank. This prevented the tank from collecting rainwater and it meant the club was using an unnecessarily large amount of drinking water and increasing water costs.

This shows how a simple problem with faulty equipment can waste water in a club.

'The water audit was a real eye opener into where water was being used. I recommend that every club should have a good look at where their water is actually going,' Facility Manager Andrew Gaunt said.

Key performance indicators and benchmarks

It is important to identify water use key performance indicators (KPIs) for your club and benchmarks you want to meet. The most common water use KPI for clubs is litres a customer (L/patron/day).

Chapter 3 outlines best practice water use benchmarks for clubs. Use these guidelines to see how water efficient your club is.

You can use industry benchmarks as a target for your club.

You can also set interim water use targets for your club by subtracting identified water savings from your club's current use.

Calculating a water use KPI for a club with a cooling tower and swimming pool

Baseline water used (averaged over five years)	80 kL/day
Total water cost (supply and discharge)	$95,444
Customers a day (average from yearly figures)	2,000 + 200 staff
KPI (L/patron/day)	**37**

After conducting a water efficiency audit, savings of 10% or eight kilolitres a day were identified.

Current water use	80 kL/day
Water savings identified	8 kL/day
Target water use	72 kL/day
Water savings	$9,615
Payback	0.4 years
Target KPI (L/patron/day)	**33**

The reduction in water use and costs was achieved by fixing leaking urinals, maintaining pool equipment, reducing flow in basins and showers, and improving management of a water feature.

By reducing water use to 33 L/patron/day, the club was performing better than the average club with a cooling tower and swimming pool, but was still using more water than the best practice KPI of 28 L/patron/day. The club will need ongoing reviews and improvements to achieve best practice.

You can use EDC Online to calculate KPIs for your club and compare them to industry benchmarks.

Micro KPIs

KPIs should also be set for equipment that uses large amounts of water.

Equipment/area	KPI
Amenities	L/patron/day
Cooling towers	kL/day (take note of the impact different seasons have on cooling tower water use)
Hot water	L/patron/day
Kitchens	L/patron/day or L/meal (cover)/day
Cafés	L/tables/day
Irrigation	L/m^3/year

Examples of micro KPIs

Action plans

Once you have measured water use, developed KPIs and compared them to best practice benchmarks, you can develop an action plan. The action plan can prioritise your plans for water efficiency and any financial investment you will need to make.

Some factors to consider when prioritising projects include:

- cost saving opportunities
- water savings and environmental benefits
- customer and tenant demand
- funding availability
- legal requirements
- tenant, customer and management support
- impact of ongoing water restrictions
- technical requirements and the abilities of your team.

By understanding your priorities, you can develop a water efficiency plan with clear objectives and achievable targets.

Formal processes for setting action plans are a key part of the EDC Business Program.

Think laterally

Look beyond water use in your water efficiency audit. Energy and water use are linked. By using simple measures to reduce the heat load in your building (such as replacing incandescent globes with low energy fluorescents), you reduce the load on the cooling tower. This will reduce water loss and save on water and energy bills. Reducing water use can also save on chemical use, chemical treatment costs and cleaning operations.

Review your progress

Regularly reviewing your water efficiency progress means you can report on:

- how much water you have saved
- how your water savings have affected your KPIs
- the costs and benefits of your actions
- the success and challenge of implementing water saving projects.

Reviews help you re-focus and prioritise water efficiency projects. It is important to approach water efficiency in a simple and systematic way.

Continual improvement is a key element of the EDC Business Program.

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Chapter 9

Water wise education

Education and good communication are vital elements of an effective water management system.

People think that protecting water supplies, water efficiency and drought management are the most important environmental issues in NSW (DECC, 2007). So it makes sense to let all your staff and customers know what you are doing to save water and how they can help. This can boost staff morale and enhance community perceptions.

Water efficiency campaigns

Key elements of an effective campaign include:

Involving staff

Staff, particularly cleaning and kitchen staff can be the eyes and ears of your water efficiency program. Visible leaks, such as leaking toilets and taps, can be easily fixed if staff report them early.

Make sure your staff and customers know how to report leaks, or equipment that wastes water. Members of the EDC Business Program can order stickers and posters with water efficiency and leak reporting messages.

Meet with contractors and their staff, especially cooling tower specialists and amenities cleaning contractors. Communicate your club's commitment to water efficiency and your expectations that contractors will be water wise.

Fixing leaks quickly

Allowing leaks to go unfixed or failing to replace old, leaky equipment will quickly undermine your water efficiency efforts. On the other hand, a responsive maintenance team that makes sure water is not wasted will reinforce perceptions that club owners and managers are environmentally responsible and care about water efficiency. Staff and customers are more likely to report leaks when they know they get dealt with quickly.

Providing feedback

It's easier for people to change their behaviour if they receive relevant information and feedback. Discuss water and energy use at team meetings, and put graphs of water use on notice boards. This information enables staff to evaluate and change their behaviour as individuals and as a team.

EDC education resources

Hospitality staff training DVD

Sydney Water's hospitality staff DVD talks about why we want to save water and what your staff can do to help. It is ideal for staff training sessions.

Save it stickers

Write the phone number of your plumbing maintenance staff on these stickers and place them in bathrooms so staff and visitors know who to report leaks to.

Save it stickers – Chinese

These stickers allow you to communicate water efficiency messages to Chinese speaking visitors and staff.

Shower hangers

Remind staff that a shower that is one minute shorter today, saves nine litres of water for tomorrow. Co-branded shower hangers can be developed for EDC Business Program customers.

Posters

EDC Business Program customers can order a range of co-branded water efficiency

posters. The posters can be displayed in amenities and staffrooms and near other water-using equipment.

To see the latest EDC education resources, visit sydneywater.com.au

Other programs

New organisations have been formed to meet the increased demand for environmental efficiency information in the hospitality industry.

Green Table Australia

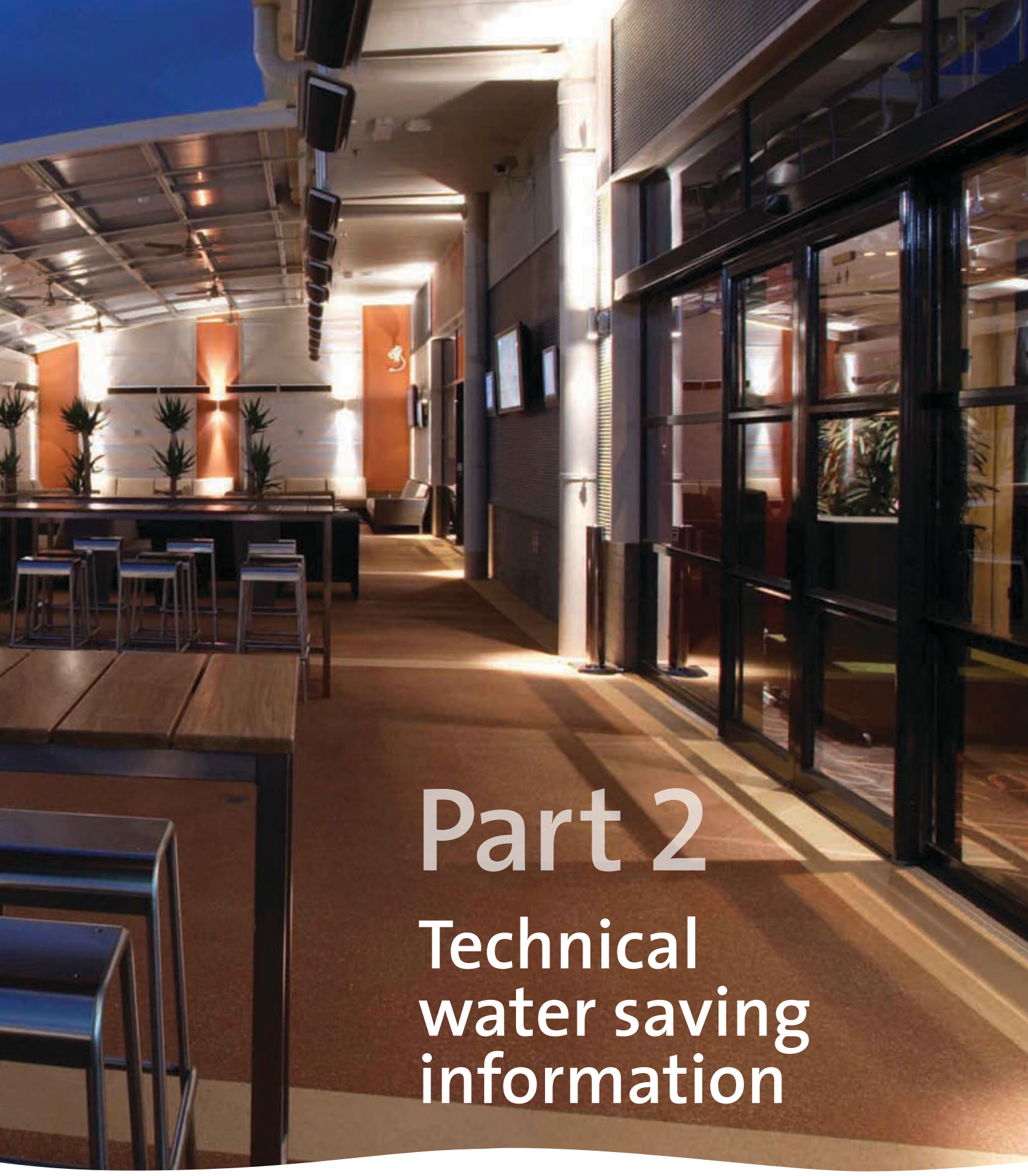
The Restaurant and Catering Association manages the Green Table Australia scheme. It is an environmental certification program for restaurants and catering businesses. In the first phase of the accreditation program, businesses must meet minimum standards in water and energy efficiency, waste management and supply chain management. More information is available at www.greentable.com.au

Australian Warewashing Association

The newly incorporated Australian Warewashing Association is developing industry standards for efficient commercial warewashing equipment.

References

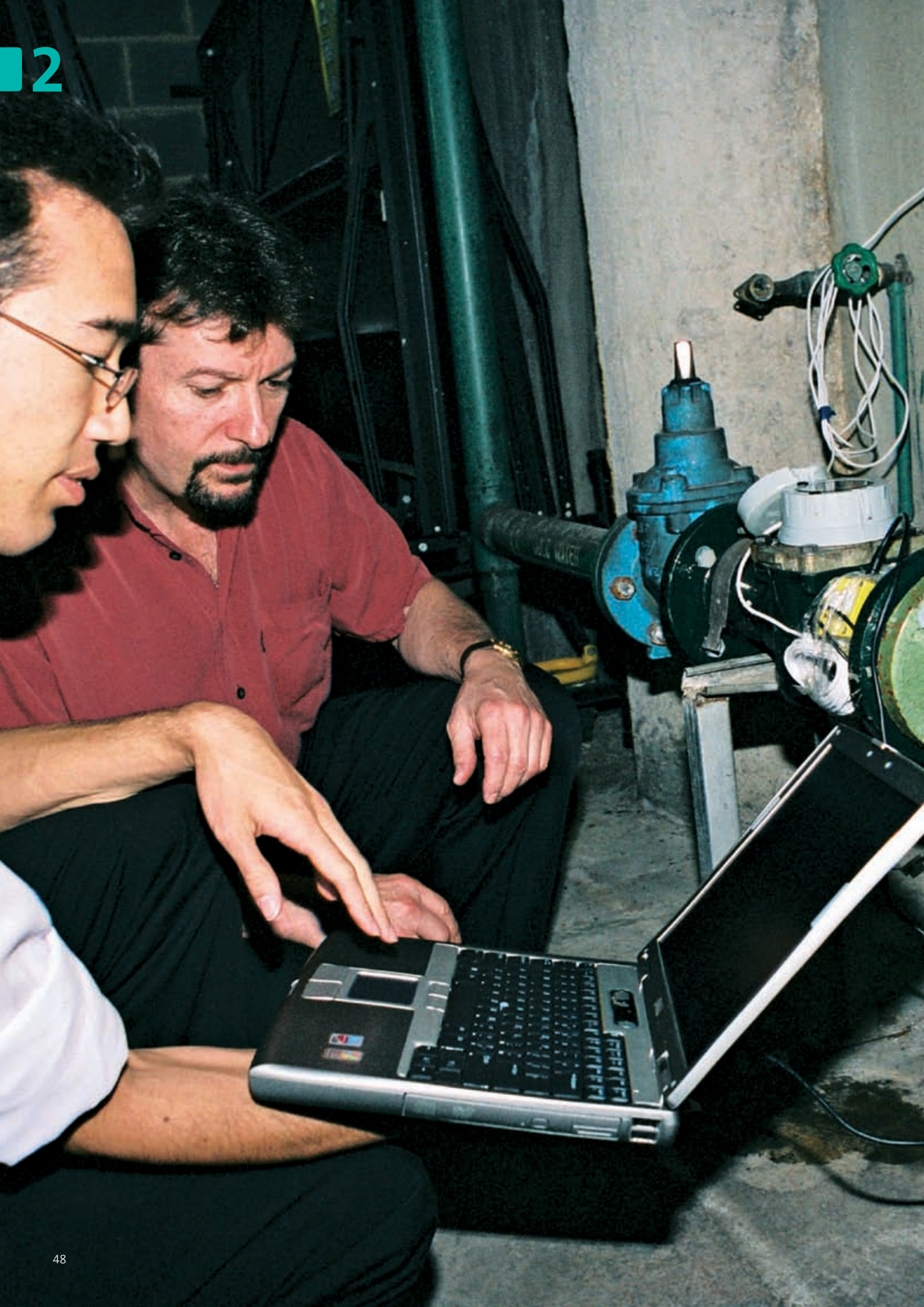
Department of Environment and Climate Change NSW, *Who Cares About Water and Climate Change in 2007*, 2007, viewed 10 October 2008, www.environment.nsw.gov.au/community/Whocares2007.htm



Part 2

Technical water saving information

Part 2 of the ***Best practice guidelines for water efficiency in clubs*** gives owners and facility managers practical information on how to implement water efficiency projects.



Chapter 10

Identifying and fixing leaks

The priority in any water efficiency campaign is to find and fix leaks. Water audits conducted on clubs by the EDC Business Program show up to 32% of water is wasted through leaks.

Large leaks can be detected when regular manual monitoring shows a rapid and unaccounted increase in water use. However, if a leak is small or has been happening for a long time, a continuous monitoring system will detect it best.

Base flow is the continual flow of water detected by monitoring systems. It is most easily detected in businesses that are shut down overnight. Typical causes include cyclic flushing urinals running overnight, cooling towers running all night, leaking toilets or taps, or taps simply left running.

Leaking amenities, toilets and taps can be spotted by just looking for them.

Leaks from broken pipes may be hard to identify because they can be underground, hidden behind infrastructure or discharging directly to stormwater or sewer.

If continuous monitoring indicates a leak that can't be seen, you might need to conduct an isolation test using the isolation valves in your hydraulic system to find its location. Companies also offer leak detection services.

Leaking hot water from showers, basins and kitchens can cost thousands of dollars a year in water and energy. Every kilolitre of wasted hot water costs up to $11.00 when you take into account the costs of metered water, peak electricity pricing, sewer and trade wastewater discharge.

A systematic approach

Implementing a regular and systematic maintenance program is the best way to identify and address leaks (Table 4).

Check your water bill	• Compare water bills from the same period in the previous year as well as the bill for the previous month or quarter. • Calculate and compare your KPI of kL/patron/day against the previous month, and against your target.
Monitoring	• Read the water meter at least every week, or install monitoring equipment. See Chapter 7.
Sub meters	• Install sub meters to the water supply serving amenities, kitchens, cooling towers, swimming pools and outdoor areas. This will help you identify where water is being used in your club and where base flows and leaks are happening. See Chapter 7.
Regular inspections (fortnightly or weekly)	• Inspect amenities, kitchens, cooling towers, swimming pools and outdoor areas to find new leaks quickly. • Incorporate inspections into cleaning and maintenance staff job roles.
Contractors and staff awareness and training	• Inform contractors and staff of their roles and responsibilities. • Communicate your water efficiency KPIs to contractors and their staff, especially cooling tower specialists and amenities cleaning contractors. • Ask contractors to alert you to problems as soon as possible, and to document issues in written reports. • Give maintenance staff a limited pre-approved budget so they can quickly buy equipment to make essential repairs.
Planned or proactive maintenance	• Regular maintenance is the best way to prevent leaks in water-using equipment. Focus maintenance on amenities, urinals, sensor flush units and cooling towers. • Make maintenance proactive. Regularly replace urinal sensor batteries and tap washers. This helps stop leaks, enables budgets to be planned and lets you schedule work more effectively.

Table 4 – Water management and maintenance actions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Chapter 11

Saving water in amenities

Amenities account for up to 30% of water use in clubs. This means you can achieve large water savings with practical, cost effective actions.

Taps and showers

In some buildings, taps in hand basins run at up to 20 L/minute. Flow can easily be restricted to six litres a minute or less by installing flow restrictors that achieve a minimum Water Efficient Labelling and Standards scheme (WELS) 3 star rated flow or less. Taps with a flow as low as 1.9 L/minute are available.

Sensor activated taps can replace taps that can be left running and can improve washroom hygiene. Sensor taps require regular inspection to ensure that the sensor unit works soundly, cuts off when needed and isn't falsely triggered by bathroom traffic or light movement. Make sure the flow through taps is less than six litres a minute. If sensor taps aren't adjusted and maintained properly, they have the potential to use more water than standard taps.

Clubs with gyms and recreational facilities generally have showers. Older showerheads typically have a flow of 15–20 L/minute. Installing flow restrictors will reduce the flow to nine litres a minute or less. Old showerheads can also be replaced with WELS 3 star rated showerheads or higher.

Case study
270 Pitt Street, Sydney

Clubs and commercial buildings both use about one-third of their water in amenities. Managers of commercial buildings have made big cuts to water use by improving amenities, and clubs can do the same.

Water use at a 15 storey commercial building at 270 Pitt Street has fallen by 60% after property owners ISPT and managers CB Richard Ellis upgraded amenities.

An after-hours audit discovered leaking urinals. Although urinals were fitted with sensors, broken solenoids were not shutting off and malfunctioning sensors were constantly being tripped by bathroom traffic. Old style single flush 16 L toilet cisterns were also leaking and flow rates in basin taps were high.

A complete replacement included installing dual flush 4 star toilet cisterns and pans, and flow restrictors on taps. On some floors new style ultra low flow urinals were installed, and on others urinal sensors were adjusted and solenoids replaced.

Cutting water waste has also lead to a five per cent reduction in electricity use, mainly because less water now needs to be pumped to the roof top storage tank that services amenities.

Toilets

Replacing just one 11 L single flush toilet with a WELS 5 star rated 4.5/3 L dual flush toilet can save 140 kL of water every year and $451 in water and wastewater costs.

The amount of water used in older single flush toilets can be reduced from 11 L to nine litres a flush by installing a cistern weight. Reducing the flush amount to less than nine litres a flush is not recommended because old toilet pans need enough water during a flush to properly clear the pan.

If you are buying new toilets, aim for models with a WELS 3 star rating or higher. If you are using very low flush toilets (such as 4.5/3 L dual flush models), it is wise to consider how steeply pipes drain. Pipes with a low gradient may become clogged with very low water flows. Check with the toilet manufacturer for installation advice.

Vacuum toilets can also be used for amenities that are connected directly to sewer systems. Water use is about 0.5 L a flush. A vacuum system needs a pump to create the vacuum. One pump can service a number of toilets and can be located in a different room or in the ceiling space. Vacuum toilets look similar to traditional flushing toilets and installation costs are comparable.

Zero water use composting toilets are more common in Europe and North America than in Australia. They are the most water efficient system available as they remove the need for water and do not create black water. Composting toilets do need more space than traditional flushing toilets, and need specific cleaning and maintenance programs to ensure a sterile environment and to minimise odours. They are more commonly used in Australia in remote areas with no sewer infrastructure such as campsites and lodges in national parks.

Urinals

There are various types of urinals.

Some types, such as cyclic flushing and sensor-operated urinals, can use high amounts of water if they are incorrectly set up. These types can be easily replaced with on-demand or manual flushing systems, or better calibrated sensors.

To ensure your urinals operate efficiently:

- adjust sensors to flush urinals after use, and ensure they don't flush with general bathroom traffic
- replace batteries on urinal sensors regularly. Flat batteries can lead to continuous flushing
- implement a regular maintenance program to detect leaks and make adjustments as needed
- make sure each sensor only operates one urinal
- install manual shut-off valves. Malfunctioning sensors can cause continuous flushing and waste a lot of water.

If you are thinking about renovating your amenities, consider installing urinals with a 5 or 6 star rating or an appropriate low flow or waterless urinal.

For more information on selecting and installing different types of urinals, download a copy of the EDC Business Program *Waterless urinals* fact sheet from sydneywater.com.au

Staff amenities

Maintenance of staff-only toilets and taps can be a low priority for maintenance staff because they aren't subject to public scrutiny. But leaks and water waste still cost money. If you do not fix leaks and inefficient equipment in staff areas it will show a lack of commitment to water efficiency by building managers.

Sydney Water's Save It stickers are a good way to encourage staff to report leaks to plumbing or maintenance staff. Printed stickers are available for EDC Business Program customers and artwork is available at sydneywater.com.au

Maintaining amenities

An active maintenance program is essential to detect leaks and broken amenities. Good maintenance is often the cheapest and most effective way to be water efficient. Make sure staff know how to report leaks and other problems.

Key actions for amenities maintenance:

- Ensure toilets, urinals, taps and showers are regularly inspected for leaks.
- Replace rubber cistern seals every two years to avoid leaks.
- Check urinal sensors work correctly and do not trigger a flush when customers are only using basins or entering toilet cubicles.
- Check that solenoid valves on urinal cisterns are not leaking.
- Install flow restrictors on all non-regulated taps.

WELS ratings explained

WELS is the Water Efficient Labelling and Standards program. WELS gives products a star rating based on their water efficiency.

WELS ratings are available for taps, toilets, showers and urinals. The ratings are taken from *AS/NZS 6400:2005 amendment 3 2006*.

Rating	Specification (L/min)
0 Star	> 16
1 Star	> 12 and =< 16
2 Star	> 9.0 and =< 12
3 Star	> 7.5 and =< 9
4 Star	> 6 and =< 7.5
5 Star	> 4.5 and =< 6.0
6 Star	=< 4.5

Table 5 – WELS rating specifications for taps

Rating	Full	Half	Average (L/flush)
0 Star	N/A	N/A	N/A
1 Star	=< 9.5	=< 4.5	=< 5.5
2 Star	< 9.5	=< 4.5	=< 4.5
3 Star	=< 6.5	=< 3.5	=< 4.0
4 Star	=< 4.7	=< 3.2	=< 3.5
5 Star	=< 4.7	N/A	=< 3.0
6 Star	=< 4.7	N/A	=< 2.5

Table 6 – WELS rating specifications for toilets

Rating	Specification (L/min)
0 Star	> 16
1 Star	> 12 and =< 16
2 Star	> 9.0 and =< 12
3 Star	> 7.5 and =< 9.0[a]
4 Star	> 6.0 and =< 7.5[a]
5 Star	> 4.5 and =< 6.0[a]
6 Star	> 4.5 and =< 6.0 and fitted with bonus features (eg automatic shut-off)[a]

Table 7 – WELS rating specifications for showers

[a]subject to finalisation of industry force of spray test

Rating	Specification (L/single stall or L/600 mm of continuous length)
0 Star	> 2.5 serving a single stall or 4.0 for two stalls
1 Star	=< 4.0 serving two stalls or equivalent continuous width[a]
2 Star	=< 2.5 serving a single stall or equivalent continuous width[a]
3 Star	=< 2.0 serving a single stall or equivalent continuous width[a]
4 Star	=< 1.5 serving a single stall or equivalent continuous width[a]
5 Star	=< 1.0 serving a single stall or equivalent continuous width[a]
6 Star	=< 1.0 serving a single stall or equivalent continuous width[b]

Table 8 – WELS rating specifications for urinals

[a]must be fitted with demand-driven or smart-demand operation

[b]must be fitted with demand-driven or smart-demand operation with a urine sensing device

References

AS//NZS 6400:2505 amendment 3 Water Efficient Products – Rating and Labelling, 2006

Chapter 12

Saving water in kitchens

Kitchens can use nearly 40% of your water.

The main areas of water use in kitchens are:

- basins and sinks, especially if running water is used for thawing food or to rinse food scraps and grease from plates before washing
- food preparation, including thawing, or blanching food and cooling pasta
- inefficient pre rinse spray valves
- water-cooled wok stoves, and yum cha and rice steamers
- dishwashers and glasswashers
- icemakers
- cleaning.

Even in busy restaurants it is important to report leaks and undertake regular maintenance. One leaking hose in one restaurant audited by Sydney Water wasted one kilolitre a day.

Basins and sinks

Install separate sinks for hand washing and food preparation. Basins used for hand washing should have flow restrictors on taps, as described in the last chapter. If taps are only used for filling pots and pans and filling sinks for dishwashing, flow can be maintained at nine litres a minute. Regularly inspect kitchen taps for leaks.

Use an efficient pre rinse spray valve to rinse plates rather than a kitchen tap. Don't use running water to thaw food.

Food preparation

Some kitchen staff use running water to thaw frozen food. This method can use up to six kilolitres of water every day, and can allow food poisoning organisms to grow. To save water and reduce health risks, thaw food by:

- placing frozen food in a refrigerator the night before using it. This will enable the food to thaw while remaining cool, retaining good texture and remaining free of contamination from bacteria and toxins
- using a microwave oven. Only use this method of thawing food if you intend to cook meat immediately, as the microwave can start the cooking process.

Food Safety Standards in New South Wales require kitchens to minimise the amount of time foods such as meat are kept at between 5°C and 60°C. Defrosting food under running water is likely to put food into this temperature zone.

Pre rinse spray valves

Pre rinse spray valves are used to remove food scraps and grease from dishes before they go into the dishwasher. They are used instead of rinsing dishes under running taps.

Litres of water per food cover	
Good	< 35
Fair	35–45
Poor	> 45

Water use is based on total kitchen water use divided by the number of covers prepared.

Table 9 – Benchmarks for kitchens

Standard pre rinse spray valves use a surprisingly large amount of water. A Sydney Water study estimated that pre rinse spray valves in Sydney may use 5,900 ML of water every year. This is similar to supplying about 23,000 houses with water for a year.

Older pre rinse spray valves have a spray nozzle similar to a showerhead and use between 10 L and 15 L of water a minute. They don't have a strong jet of water and are slow to clean.

Efficient valves use only six litres of water a minute – 40% less than older models.

Sydney Water is helping businesses replace inefficient pre rinse spray valves with a water efficient Smart Rinse valve.

Smart Rinse valves have a nozzle with a high pressure, blade-shaped spray. The high water pressure and cutting action means that dishes are cleaned quickly and effectively.

A Sydney Water study showed that hospitality businesses can make large water and energy savings by using a Smart Rinse valve. Table 10 shows how much water and money was saved at four sites retrofitted with a Smart Rinse valve. Hot and cold water use at each site was monitored for four weeks.

Smart Rinse valves generally deliver water at between 40°C and 60°C. This means 60% of cost savings are from reduced energy use.

Inspect all pre rinse spray valves regularly and replace them if the fittings are worn. Worn nozzles will reduce pressure and spray angle, wasting water and increasing washing time. Check with your supplier to make sure you are using the right design of spray rinse valve for your job.

To take part in Sydney Water's Smart Rinse program call 1800 622 695. The program runs until 2011.

Wok stoves and steamers

Asian style restaurants that use water-cooled woks and steamers are big water users. Water-cooled woks can account for up to 75% of water used in restaurants.

Waterless woks can save large amounts of water. The concept for the waterless wok was developed by Sydney Water and has been adopted by several stove manufacturers. Waterless woks use air instead of water to cool the wok and can save a busy kitchen up to five kilolitres of water a day.

The Ethnic Communities Council (ECC) of NSW is rolling out waterless woks to restaurants and giving grants to cover the costs of replacing old woks. The ECC can also provide multilingual translators and videos as part of its education program. Contact the ECC at wok@eccnsw.org.au

Steamers use water to cool equipment and cook food. Efficient steamers can use up to 90% less water and up to 60% less energy than older models.

They also have shorter cooking times, higher production rates and lose less heat.

Dishwashers

Dishwashers and under bench washers are used in many club cafes and restaurants.

Site	Kitchen water savings (L/day)	Water savings (% of original use)	Annual cost savings#
Hotel	695	50	$1,759
Cafe	449	46.5	$1,448
Pizza restaurant	232	42	$635
Club	100	29	$240

Table 10 – Typical water, waste and cost savings for various types of business using low flow pre rinse spray valves.

Water charges are based on 2009–10 Sydney Water costs and heating costs based on an average of gas and electricity prices. Electricity is an average of $0.167/kWh and gas is $0.0175/MJ.

Case study
North Ryde Golf Club

The North Ryde Golf Club used the ECC waterless wok subsidy to replace three of their water intensive low temperature woks.

The installation of waterless woks has reduced water use in the kitchen by 85%, while increasing cooking temperatures and cutting cooking times.

'My chef kept asking me for a new turbo charged wok that was hotter and faster. Since installing the waterless woks, my chef has been very happy with the reduced cooking times and the amount of water we save,' Brenden Ellam General Manager of North Ryde Golf Club said.

The following basic procedures can make dishwashers run more efficiently and save money in water, wastewater and chemical costs:

- Make sure dishwashers are fully loaded before use. If racks don't suit the type of dishes you are washing and you can't load them efficiently, talk to your supplier about different rack configurations.
- Scrape food scraps from plates and cooking equipment into the bin and use an efficient pre–rinse spray valve to rinse plates before they are loaded into the dishwasher.
- Replace worn or missing nozzles. One missing nozzle can double water use in a dishwasher. Worn nozzles may not clean efficiently, leaving dirty dishes.
- Follow the manufacturer's recommended flow rate.
- If using a rack conveyor dishwasher, fit an auto timer or electronic sensor to prevent rinse water running when dishes are not passing through the system.
- Replace scrapping trough systems with a conveyor system that does not need water to carry waste from the base of the dishwasher to the disposal unit.

New dishwashers can cut your running costs by reducing demand for water, hot water and detergent.

Glasswashers

Glasswashers are a large user of water in clubs and can be used up to 80 times a day. Older style glasswashers are water intensive and use between nine L and 17 L of water a cycle. In comparison, new water efficient models use as little as two litres a cycle.

Inefficient glasswashers are common, with up to 80% of hospitality businesses surveyed by Sydney Water still using 'wash and dump' models that don't recycle water.

Water efficient glasswashers reuse final rinse water. The final rinse water is quite clean and can be used as the wash water for the next cycle.

Water in glasswashers is generally heated to about 80 °C in the wash and rinse cycles. This means replacing an old glasswasher with a new model will cut energy costs, while less water use means less detergent is needed for each cycle.

Staff can also be trained to use dishwashers and glasswashers more efficiently. Ask staff to fully load machines before using them. Many hospitality staff who were interviewed said they ran cycles 'with all the buttons and all the lights on' to ensure the machine was working correctly. However, this actually means the machine is running with both a hot and a cold rinse cycle, which is energy and water intensive.

Ice making machines

Ice making machines can use a lot of water and energy. Make sure your machine is not oversized or set to make more ice than needed.

Air-cooled ice machines are far more water efficient than water-cooled models.

Water-cooled machines may use less energy. If you do choose a water-cooled machine, make sure it uses an evaporative condenser to cool, and not a 'one pass' system.

One pass systems are very water intensive.

Cleaning

These recommendations can cut the amount of water used for kitchen cleaning:

- Use a sink strainer or dry waste arrestor to trap food scraps before disposal.
- Scrape food off plates before using a pre rinse spray valve.
- Sweep or mop the floor instead of hosing it down with water.

Sink-to-sewer waste disposal units

Sydney Water's *Trade waste management plan for commercial customers* does not allow sink-to-sewer disposal units (also called in-sink food waste disposal units or garbage grinders) in non-domestic buildings.


DNC

Chapter 13

Saving water in cooling systems

Cooling towers account for about 15% of water use in clubs. Good maintenance will help you save water and follow important health regulations.

In a well maintained cooling tower, evaporation is about 88% of water use. Cooling towers use more water in summer. Summer peak daily water use is often twice the average daily load.

The best ways to save water in cooling towers are to:

- fix leaks and stop unnecessary water loss from drift, splash and bleed
- minimise heat loads on your cooling tower by improving energy efficiency in your building
- identify alternative water sources for your cooling tower.

How a cooling tower works

Cooling towers are a key part of most large air conditioning systems. Cooling towers transfer heat from the air conditioning system to the outside air.

Water circulates through the cooling tower loop, which is made up of the cooling tower and chiller. Heat is removed from the air conditioning system and transferred to the water through the chiller. The heat in the water is then transferred to the outside air by evaporating it in the cooling tower.

Common cooling tower terms are:

- Make up: water is supplied to the cooling tower to make up for evaporation, drift loss, bleed and overflow. Metering make up water is a critical step to maximise cooling tower efficiency.
- Evaporation: removes heat from the water by changing it to vapour. Evaporation is an essential part of cooling tower operations.
- Bleed: removes water from the cooling tower system to reduce the amount of dissolved and suspended solids. Bleed is normally automated.
- Drift: happens when water drops are carried away with exhaust air. Drift eliminators reduce drift losses.
- Splash: water splashing out of the cooling tower, sometimes because of strong winds.
- Overflow: water that flows over the basin of a cooling tower or through the tower overflow pipe. Efficient cooling towers will have no overflow. Overflow in some poorly maintained cooling towers is as high as 80% of water use.
- Cycles of concentration: as water in the cooling tower is evaporated, salts that were dissolved in the water are left behind. This concentrates the salts in the remaining water. Cycles of concentration means the number of times the salts in the cooling tower water are concentrated by evaporation.
- Legionella: a bacteria that grows in the warm, damp environment of cooling towers and can cause pneumonia. Cooling towers must be treated with biocides to stop the growth of Legionella. Cooling tower owners must comply with public health laws to keep their cooling towers safe.
- Packing: the packing in a cooling tower breaks water into small drops so that there is a greater surface area for air contact.

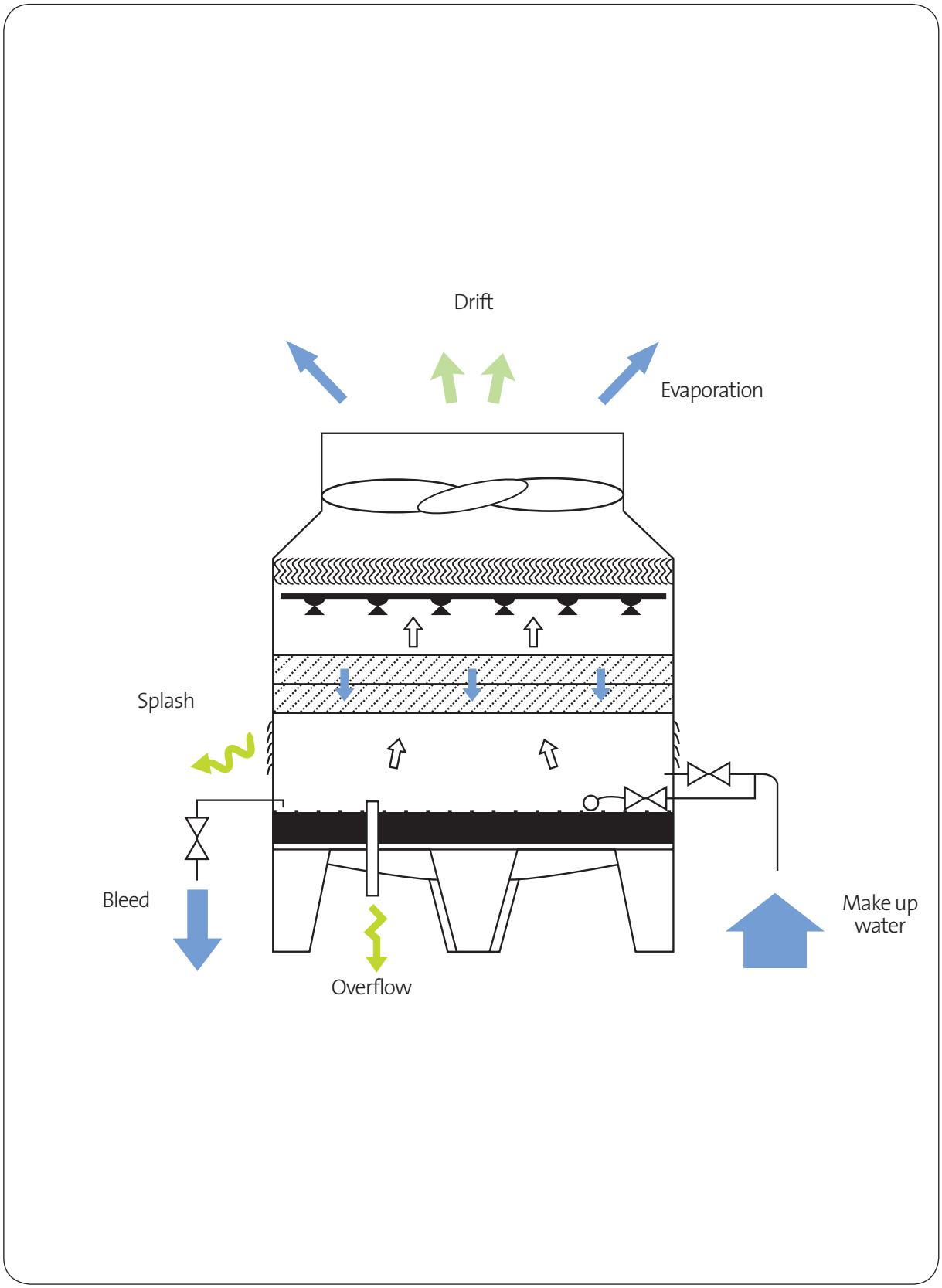

Figure 16 – Key features of a typical cooling tower

Cooling tower management actions

Cooling tower reports	• Read your monthly cooling tower report. Check and trend the conductivity reading. A very low reading may show excess water use. Ask your cooling tower contractor to explain your reading. • Ask contractors to highlight in their reports where you need to take action. Talk to your cooling tower contractor to discuss any issues you don't understand. • Use a performance-based contract that includes specific water efficiency KPIs to manage your cooling tower maintenance contractor.
Monitoring	• Install water meters on the cooling tower's water supply, or make up line. • Read water meters regularly or install logging equipment. See Chapter 7.
Operation	• Most Sydney cooling towers should have nine cycles of concentration or more. If your cooling tower is operating on less than nine cycles of concentration, ask your contractor why. Increasing cycles from three to nine can cut the amount of bleed by 25%. Reducing bleed may require adjustments to your treatment program. • Adjust the operating hours of your cooling tower so it doesn't run overnight. • Supplement your cooling tower water supply with alternative water sources such as rainwater or chiller condensate. If you are considering using chiller condensate, talk to your EDC Business Program representative about Sydney Water's condensate calculator.
Regular inspections	• Conduct preventative maintenance monthly. • Check ball float valves are set at the right level. Floats often get stuck at a high level, directing the water straight to overflow. • Check that drift loss is acceptable. • Check that packing is in good condition.
Responsibility	•Building owners are responsible for meeting health and maintenance regulations and preventing Legionella outbreaks. You need to be sure your contractors are following all regulations.

Table 11 – Cooling tower management actions

The Sydney Water *Best practice guidelines for cooling towers* gives detailed information on cooling tower operations and health and regulatory issues. Contact the EDC Business Program for a copy, or visit sydneywater.com.au

Alternatives to cooling towers

Cooling towers are popular choices for buildings because they are reliable, the technology is well understood and, if well maintained, they are relatively cost effective to operate.

There are alternatives to traditional cooling towers which are becoming more widely used.

They are generally most appropriate in buildings where smart design and good management has cut indoor and outdoor heat gain. This is because alternative systems may not have the same cooling capacity as traditional systems.

Air-cooled chillers

Air-cooled chillers do not use cooling towers. They remove the water loop by relying on different temperatures to transfer heat from the air conditioning system to the atmosphere.

Air-cooled chillers are best suited to systems operating at less than 450kW of refrigeration. Advantages of air-cooled chillers include:

- very low water use
- low maintenance costs
- little need for chemical treatment
- limited Legionella risk.

They do have disadvantages:

- They are not as efficient as cooling towers in rejecting heat because most peak loads happen during hot weather.
- Air-cooled systems generally need large airflow rates or large surface areas to reject heat.
- They can be noisy.

Hybrid cooling systems

Hybrid cooling systems use a combination of conventional water-cooled and air-cooled systems. Water to be cooled is first passed through the dry air-cooled section and then through the wet section of the cooling tower.

There are health and operational efficiency advantages of hybrid cooling systems. During cooler times of the year, only the dry cooling tower section is needed, reducing water use. This can be up to 68% less than conventional cooling towers and the risks of Legionella outbreaks are minimised.

The capital costs for hybrid cooling systems can be two to three times higher than a conventional cooling tower.

Ground source geothermal systems

Geothermal systems pass cooling water through a series of long loops (bores) buried deep in the ground. Unwanted heat is passed to the soil and rocks. Since this is a closed loop system, there is little or no water use.

Geothermal systems have been installed at Macquarie University and at the NSW Department of Environment and Climate Change at Lidcombe.

Geothermal systems need a large amount of land for bores and can cost up to 40% more to install than conventional water-cooled systems. They can be very cost effective to operate, and have low maintenance costs and little Legionella risk.

Phase change materials cooling systems

Phase change materials (PCMs) systems take advantage of the energy storage properties of different materials and can be used in commercial building cooling systems. There are two types of systems: passive and active phase change designs.

Passive phase change designs use PCMs within building materials such as concrete, gypsum wallboard, or in the ceiling or floor to increase their thermal storage capacity. This can increase the comfort of occupants by reducing the magnitude of temperature swings (Bruno, 2005).

Active phase change designs use PCMs such as ice or chilled water. In these systems, the ice or chilled water is made overnight when temperatures are generally lower and electricity is cheaper. During the day, heat is dissipated into the ice or chilled water (Bruno, 2005).

PCM systems can be used together with more traditional heating and cooling systems so it is no longer necessary to install very large chillers to deal specifically with peak loads that happen on only a few hot summer days. This cuts capital costs and cuts water and electricity use because cooling takes place at night when temperatures are lower.

Chilled beam cooling systems

Chilled beam cooling systems are becoming more common in Sydney. In these systems, chilled water is circulated through elements in the ceiling.

Rising warm air is cooled by the chilled beams and falls. Chilled beam systems allow fresh air to be circulated throughout the building. Radiant cooling from the chilled beams means that building occupants can still be comfortable even though the temperature is slightly higher than when a traditional cooling system is used.

Reducing the need for cooling systems

Building owners can reduce the need for cooling towers by incorporating better design that cuts the amount of heat from outside. Indoor energy efficiency can also reduce the need for large cooling systems.

The key ways to keep your building cooler are:

- reduce heat generated by electrical equipment
- reduce heat generated by lights
- use building design to use daylight and avoid outside heat.

Chapter 18 has information to help you improve your club's design if you are building or renovating.

Buildings that are designed and operated to reduce heat loads enable owners to use smaller air conditioning and ventilation plants. Reducing the size of cooling systems can lead to large savings in construction and operation.

Case study
Shellharbour Workers Club

When Shellharbour Workers Club – Shellys – in the Illawarra was due for an upgrade, managers took the opportunity to make it more energy and water efficient.

Shellys is on an exposed hilltop in Shellharbour and as part of a major upgrade the club installed a 1,500 m^2 covered veranda. This provides outdoor seating for 500 people and also shades the north and east sides of the building. This cuts the amount of direct sunlight reaching the building and reduces its heat load. This has helped Shellys reduce the size of their cooling towers for the upgraded building.

Shellys also use the veranda roof to collect rainwater, which is stored in 160 kL rainwater tanks and used to flush toilets and urinals. Photovoltaic cells for solar harvesting on the veranda roof generate 22kW of power.

For more information refer to www.shellys.com.au/EnvironmentalNews.aspx

Reduce heat generated by lights

Opportunities to reduce heat produced by lights in your club include:

- using more efficient lights
- using light reflectors to direct more light away from the ceiling and down to where it's needed
- installing movement sensors to turn lights off when the building is not in use. If you use sensors, make sure they are well adjusted so they don't get triggered by birds, insects, or nearby pedestrian traffic
- installing photo sensors to reduce lighting levels when daylight is good
- dividing each space into multiple zones and installing separate light switches for each zone.

Inefficient lighting	Efficient replacement lighting	Advantages of replacement lighting	Disadvantages of replacement lighting
Standard fluorescent tubes	T5 fluorescent lights, electronic ballasts and lux reflectors	• lower energy use • slim line • less flicker and buzz • low levels of mercury • white light • long life • maintains good light over life cycle • high output lights available if needed.	• will need new fittings and ballasts.
Halogen lights	Compact fluorescent globes designed for halogen-style fittings	• lower energy use • cheaper globes with long life • good light output.	• may need new fittings • globes may not produce as many lumens or have same beam angle, so may need more globes • may need to install, replace or remove transformers and fittings.
Low voltage halogen lights	35W Infrared coated (IRC) lamps	• lower energy use for same light • a very easy way to improve halogen lamp efficiency.	

Inefficient lighting	Efficient replacement lighting	Advantages of replacement lighting	Disadvantages of replacement lighting
Low voltage halogen lights	LED lamps	• energy use cut by up to 80% • longer life globes • available in 12 and 240V • halogen globes running on 240V mains power can be directly replaced with LEDs.	• globes are more expensive • may need to remove or replace transformers used for 12V halogens to prevent damage to LED globes • globes may not produce as many lumens or have same beam angle, so may need more globes.

Table 12 – Low heat load producing alternatives to conventional lighting

Use daylight and avoid outside heat

Buildings that maximise daylight and avoid outside heat can be designed with less heating, improved ventilation and more effective air conditioning systems. This can largely reduce the cost of fitting out and operating a building.

Heat source	Solution
Outside sun and glare	• club entry air lock • veranda shading • low conductivity glass • high thermal mass walls • shade windows with louvres, curtains or tinting • reduce number and size of west facing windows • replace rounded 'barrel vault' style skylights with shaded skylights or windows set high on the wall near the eaves.

Heat source	Solution
Kitchens and food preparation areas	• use fully insulated ovens (make sure doors, walls, oven decks and drive shaft are all insulated) • use ovens with fully sealed doors, and replace worn seals regularly • install back draft dampers to stop loss of cooled air when ventilation fans are not in use • make sure heat from woks and stoves is vented • use ovens and stoves with programmable temperature and time controls.
Motors of refrigerators and freezers	• in self-service areas of cafes and shops, use refrigerator cabinets with doors to stop heat loss and reduce compressor size by up to 30%.
Hot water heating	• use instantaneous hot water systems so that water is only heated as needed.
Electrical equipment turned on for retail display	• make sure staff turn equipment off at the end of each day's trading • monitor energy and water use with sub meters.
Staff and tenant practices	• make sure staff know how to use ovens, air conditioning systems and zoned lighting efficiently • monitor and publicise energy and water use so that staff know how much they are using.

Table 13 – Common sources of heat found in clubs and suggested solutions to reduce heat load (Department of Industry, Tourism and Resources, 2003, 2004)

Case study

Mukti-Gupteshwar Mandir
Temple of Lord Shiva, Minto

The Temple of Lord Shiva in Sydney's Minto is an example of how design can cut the need for a cooling system.

The main temple holds 200 people, and 300 more can fit into the community hall. Both the main temple and community hall are underground. Over 1,000 people visit the temple each week, including a consistent stream of guests from overseas. Weddings of up to 500 are often hosted.

There is no cooling system at all and no need for one.

Most of the temple's 1,450m^2 area is underground and 4,500 trees and shrubs grace the top of the temple. The decision to place the temple underground is religious; the benefits are practical.

The earth's below ground temperature remains stable, so the underground temple benefits from geothermal mass and heat exchange, staying cool in the summer and warm in the winter. The use of skylights means the lighting bill is also reduced. A 4.5 ML dam is used for garden irrigation.

For more information refer to www.muktigupteshwar.org

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Chapter 14

Swimming pools

Swimming pools account for an average 13% of water use in clubs.

Water efficiency audits conducted by the EDC Business Program on community swimming centres show that up to 10% of water used in swimming pools is lost to leaks and 30% is used to make up for water lost during filter backwashing.

Sydney Water has studied water use at more than 30 public swimming pools and aquatic centres. Current acceptable energy and water use is shown in Table 14.

The study found that most sites could make substantial energy and water savings. Best practice guidelines will be developed that will include new benchmarks for water and energy use, and more strategies for improved pool management. The guidelines will also include reviews of new technology for pool operations.

Saving water in swimming pools

The EDC Business Program recommends the following activities to help you save water in your pool.

Water efficiency audit

Conduct a water efficiency audit. Refer to Chapter 8.

Leaks found by Sydney Water audits of swimming pools wasted between 30 and 80 kL/day. These leaks are often undetected, particularly in old pools.

Pool operations

There are many ways to improve pool operations:

- Make sure you backwash following the manufacturer's recommended frequency and health guidelines. Backwashing more often will waste water and energy, and will not improve water quality. Poor backwashing procedures can mean up to 30% of daily water use is for low-grade filter washing.
- Monitor the amount of water used to make up pool water that's lost to splash and evaporation. It should be less than 40 litres a day for each swimmer. Avoid using open hoses to manually make up water levels.
- Check the level and operation of your float valve regularly. Faulty float valves can allow unnecessary make up water into the pool.
- Use pool covers when the pool is not in use. This will reduce evaporation and heat loss. Uncovered outdoor Olympic-size swimming pools can lose up to six kilolitres of water and 100MJ of energy costing over $57,000 a year. One extra degree Celsius in air temperature increases evaporation loss by 10%.
- Keep the pool temperature as low as possible for swimmer comfort.
- Protect the pool from wind.

Activity	Acceptable water use
Benchmark	<40 L per swimmer/day
Make up water	<1 kL per kL/pool volume yearly
Energy (facility)	<20 MJ per patron
Energy (water)	<2 GJ/m^2 of heated pool surface

Table 14 – Pool facility water use

- If you operate an indoor pool, make sure humidity is at least 60% and the air temperature at least 10°C above the pool temperature.
- Wherever possible, use brooms and mops to clean instead of hosing.

Staff awareness

There are a variety of ways to improve staff awareness:

- Appoint a member of staff to manage water as part of their daily duties and make sure water efficiency is part of your staff induction program. Report water use KPIs in regular staff meetings and to management.
- Add water and energy management to the pool manager's job description and include energy and water KPIs in their performance assessment.
- Regularly remind all staff, including cleaners and sub contractors, how to report leaks.
- Make sure swimming pool staff know how much water, electricity and gas the pool uses.
- Make staff aware of the full cost of water. For example, heated pool water can cost $10/kL to replace.

Sub metering and performance monitoring

Sub meters allow you to track and trend water use to find leaks.

- Install sub meters on pool amenities and the pool make up water line. Appoint someone to regularly record meter readings and analyse data for leaks or abnormally high water use. Better still, connect meters to an automatic meter reading and reporting system.
- Record meter data and swimmer numbers and use monthly data to calculate KPIs (eg L/swimmer).
- Set targets and benchmark against other pools.

Amenities

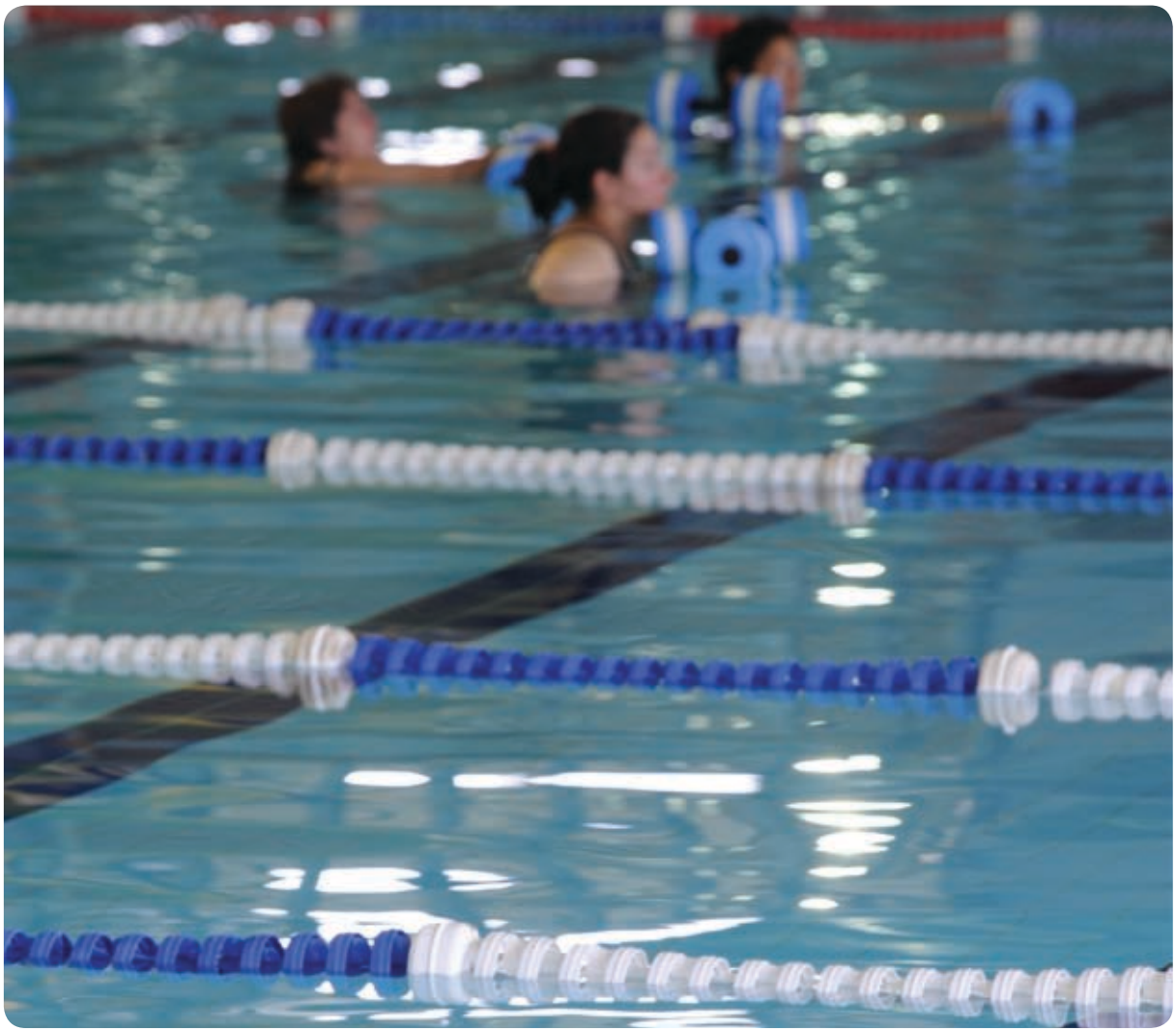
Refer to Chapter 11 for detailed information on saving water in amenities.

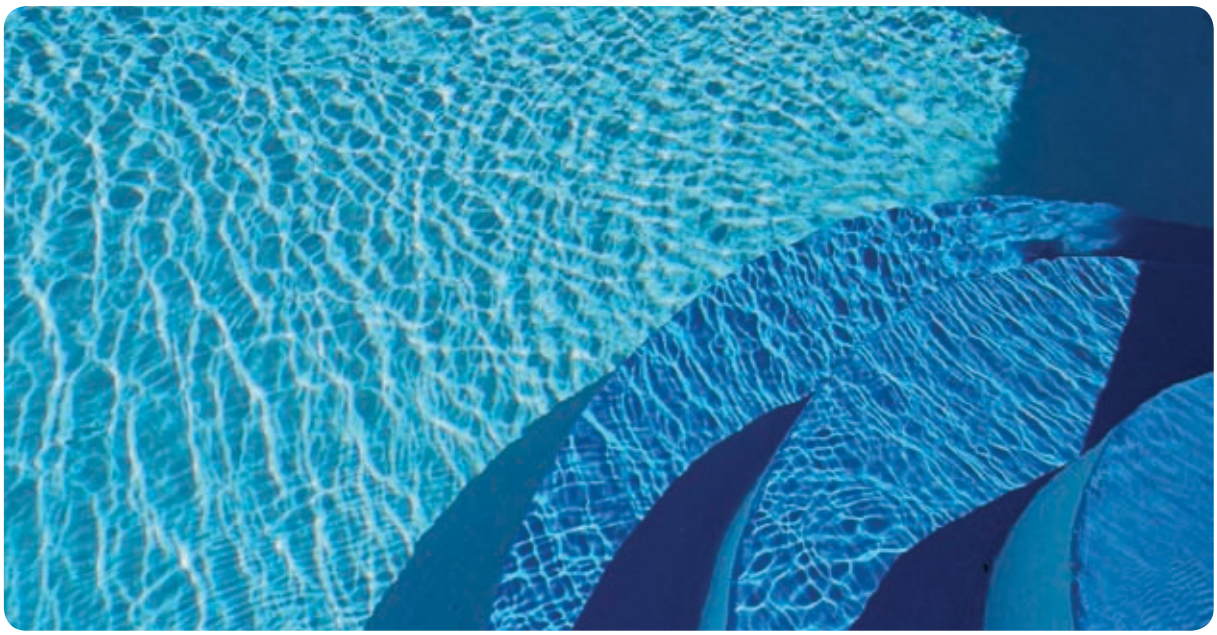
- Regularly check amenities for leaks.
- Ensure taps have a maximum flow of six litres a minute and showers have a maximum flow of nine litres a minute. Timers on taps and showers can help prevent excessive water use.
- Install dual flush toilets and check urinal sensors are working correctly.

Visitor awareness

Your clients are also water aware: allow them to help you save water.

- Make sure pool visitors know how they can save water. Put up signs that give visitors a contact name or number to report leaks or malfunctioning amenities.
- Provide soap gels to encourage swimmers to take proper soaped-up showers before swimming to reduce health risks and pool filter backwash losses.



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RECYCLING DRESSER

Chapter 15

Saving water in gardens and sports fields

You can save water and improve the appearance of gardens and sports fields by improving soil and making the best of irrigation.

Fields with poor topsoil cost more to maintain because they must be irrigated and returfed more frequently. Limited topsoil depth also affects player comfort and leads to more injuries.

The amount of water you need to use in gardens and on sports fields will depend on the:

- size of the area you irrigate
- water holding capacity of your soil
- rate at which water is lost through evaporation, soil infiltration and plant transpiration
- plant selection
- microclimate.

Sports fields are also affected by the type and frequency of sports played on them. Some areas of the field will get more use, such as in front of the goals and areas lit by night lights.

Benchmark water use – sports fields

Sydney Water has developed best practice benchmarks for water use at a range of outdoor sports facilities. Table 15 outlines indicative water use requirements for different sports facilities. Site specific benchmarks are available at sydneywater.com.au

Sports facility	Recommended irrigation rate (kL/m^2/year)
Golf green	0.60
Golf course – greens and tees combined	0.50
Golf course fairways – western Sydney*	0.14
Bowling green	0.18
Sports field – eastern and central Sydney	0.18
Sports field – western Sydney	0.14

*Only western Sydney golf courses were included in the benchmarking study

Table 15 – Indicative benchmarks for watering sports fields

Know your soils

Your soil type, structure and texture have a big influence on:

- how much water landscaped areas retain
- how rapidly they absorb or drain irrigation or rainwater
- how they cope with drought.

Good soils capture rain better, reducing how much you need to irrigate. Different soils have different water holding capacities.

Improving soil

The most reliable and cost effective way to improve soil is to improve topsoil. Sydney Water studies found some sports fields in Sydney were not irrigated during the drought and were still well grassed because they had good topsoil depth.

To survive on rainwater alone, sports fields in eastern Sydney need at least 170 mm of topsoil, and in western Sydney they need at least 200 mm of topsoil.

You can also improve the soil's ability to hold water.

In sandy soil, add manure or small amounts of clay to bind the sand particles.

Clay soil can be improved by adding manures or composts. This helps to separate the fine clay particles and allows water to infiltrate more quickly.

Maintaining your soil

Regularly aerate soil and reduce compaction to maintain good quality turf. Clay loam soil typically needs more frequent aeration than sandier soil to avoid compaction. Sandy soil is more prone to compaction if it contains a lot of organic matter.

Aeration can be achieved by extracting cores of soil. Ensure that aeration extends below the depth of compaction.

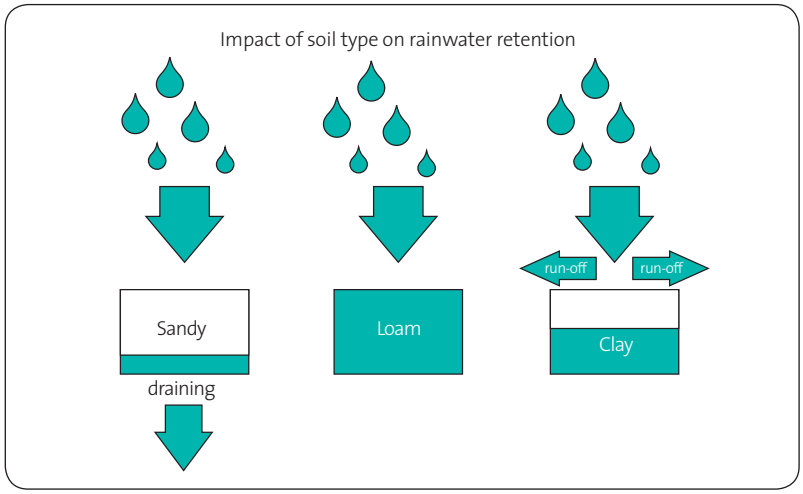


Figure 17 – An illustration of the water holding capacity of various soil types

Different soil profiles

1. Clay

2. Compacted

3. Good soil profile

4. Water repellent

Mulching gardens

Mulching around plants helps to retain water in the soil. Good mulch will add organic matter, stabilise soil temperatures and reduce evaporation from the soil surface by up to 70%. Mulch can also inhibit weed growth. Poor mulches can cause the soil to repel water. To avoid this, make sure mulch is composted before it's applied.

For best results, apply mulch between 50 mm and 70 mm deep to insulate roots from heat and suppress weed growth. Avoid fine textured mulches because they tend to remain wet for longer and weeds can become established within the mulch.

Efficient watering

Moisture probes, rainfall gauges and small weather stations are simple, inexpensive tools for identifying the watering needs of sports fields. They enable gardeners, greenkeepers and grounds managers to monitor soil moisture levels and rainfall to minimise over watering and irrigate on demand.

In gardens, it is usually best to water the base of plants and not the leaves (except ferns). This provides water directly to the roots where it is needed most and reduces evaporation and leaf burn. You can also save water by irrigating early in the morning or late in the evening.

A good landscape and irrigation assessment will recommend a site-specific irrigation management plan. This will improve irrigation efficiency, reduce the risk of waterlogging, cut over-watering and avoid unnecessary water charges.

'Many people blame the drought or [water] restrictions for a bare or brown oval. But there are many fields that received no water during restrictions and yet still remained green and well covered.

For too long irrigating with drinking water has been used as a substitute for topsoil on sporting ovals. The problem is that the soil beneath most sports fields is poor so that hardly any rain is retained. Lots of irrigation is needed if the turf is to survive,' Dr Mick Battam, Senior Soil and Irrigation Specialist, URS Australia said.

Irrigation systems

Professionally installed irrigation systems with soil moisture sensors ensure enough water is added to fill the soil profile, at a rate that matches its absorption capacity.

Automatic irrigation systems are most effective if adequately calibrated to an appropriate irrigation schedule. If you use an automatic system, make sure it has rain and soil moisture sensors so that water is only applied when the soil needs it. All systems must be inspected regularly to make sure that sprinkler heads and timers are working properly and are not wasting water.

When installing a new irrigation system for sports fields, ensure that maintenance tasks such as aeration or de-compaction can still be undertaken.

Water Wise Rules affect how you can use water on landscaped areas and active sports fields.

To know more visit sydneywater.com.au

Alternative water sources

Alternative sources of irrigation water include rainwater, greywater, water from fountains (that wouldn't otherwise be recirculated) and stormwater. These water sources are discussed in Chapters 19–22.

Case study

Shellharbour City Council, Croom Regional Sporting Complex

Shellharbour City Council and Sydney Water conducted an irrigation assessment of Croom Regional Sports Complex to find out the watering needs of the sports fields.

The 19 ha sports complex has five football fields, an athletics track, two soccer fields, three netball courts and bushland reserves.

The assessment gave a scheduled approach to irrigation and found potential cuts to water use of 25%, while maintaining the quality of the playing fields.

By improving the soil's water retention capacity using a combination of aeration, decompaction and top dressing, water use could be reduced by a further 12% and the quality of the fields improved.

In addition to potential water savings, the irrigation assessment has supported the council's plan to design a stormwater harvesting system. The council can now install a system that's appropriately sized for the revised water needs of the sporting complex.

Case study

Warilla Bowling Club

Warilla Bowling Club, south of Wollongong, wanted to reduce labour, operating and maintenance costs for its outdoor bowling greens.

The club chose to replace two outdoor bowling greens with synthetic carpet.

The club also installed twelve 10 kL rainwater tanks to collect rainwater for irrigation. A 100 kL holding tank collects runoff from the synthetic fields and the water is used to irrigate the remaining grass greens.

The club saves more than a megalitre of water every year. It has also cut costs of treatment chemicals and maintenance.

Plant selection and maintenance

The types of plants and turf you select will affect how frequently you need to water. Consider the following points when designing landscaped areas for your club:

Plants

- Extra time spent selecting plants for your landscaping will be repaid in better survival and growth rates, and a more attractive site for people to visit.
- Group plants together that have similar water requirements.
- Think about the conditions in which plants will be living. Do not use plants native to rainforests or creeks if you want them to grow next to surfaces that reflect heat and light, receive full sun, or next to vents that expel hot air.
- For information on selecting the right plants for your area and soil type, visit the Sydney Water website sydneywater.com.au

Selecting turf

- Make sure that good quality topsoil is 170 - 200 mm deep so that deep-rooted turf species, such as Kikuyu, Couch and Buffalo, can draw on deeper water reserves during droughts. Buffalo grasses (such as Palmetto) are slow growing and do not need mowing as often as other lawn grasses.
- Don't mow your lawn too short. Leave grass at least 20 mm high so that the roots are able to grow deep into the soil profiles and make use of the stored water. Maintain this length by cutting only the top third of the leaf area. In dry conditions, leave the clippings on the lawn to keep moisture in the ground and cycle nutrients back to the soil.

Chapter 16

Saving water in water features

Water features can be a focal point of club architecture or landscaping. Well designed and maintained water features use little water, but poor design, construction or maintenance can see water use climb.

Type of fountain	Water use
Small, well designed and maintained	Less than 1 kL/day to 3 kL/day depending on size
Poor design and construction, no maintenance or monitoring	Up to 200 kL/day in large, outdoor features with large leaks and poor water proofing
Poorly maintained with regular dumping and/or overflow of water	Sydney Water staff have seen examples where water use has increased by up to five times

Table 16 – Benchmarks for water features

Leaks, excessive splash, evaporation and wind drift will increase the amount of water fountains use. Good design, monitoring and regular maintenance are essential to make sure your water features are not water wasters.

There are a number of considerations for maximising the water efficiency of your water features.

Design

- Supply lines to the water features should be individually sub metered.
- Select a site for the water feature that is sheltered from wind. Wind drift can be minimised by installing fountains behind windbreaks.
- If you plan to use trees as windbreaks, choose their location and their species to reduce the number of leaves that fall into the water feature.
- Outdoor water features with shallow pools of water over large areas of dark stone can also be prone to evaporation. Use shading and lighter coloured stones.
- Rainwater and stormwater can be used to create water features without using drinking water supplies.

Maintenance

Good maintenance is one of the easiest ways to save costs:

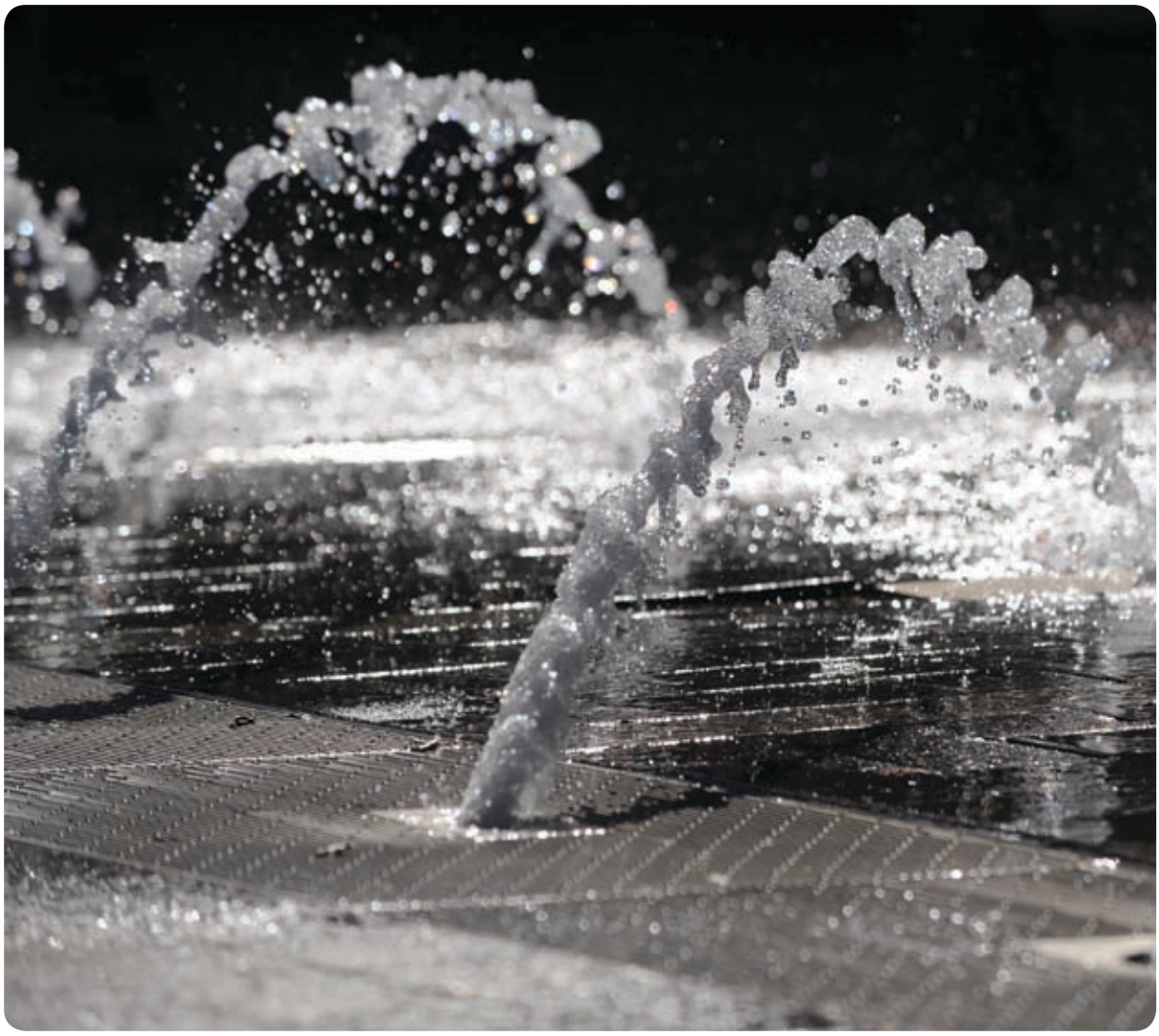
- Read water meters regularly and record water use to identify leaks and excessive water use.
- Instruct your water treatment contractor to telephone you to discuss any water waste or leaks detected in their monthly inspections. Ask them to highlight leaks in their monthly reports.
- Regularly check level sensors and float valves. These are often the cause of waste. Water features with lots of splashing can sometimes make poorly designed float valves in the balance tank bob up and down and cause top up waste.
- Fountains that produce high, fine droplets of water are prone to wind drift. Install a wind sensor that can automatically turn off water features that are

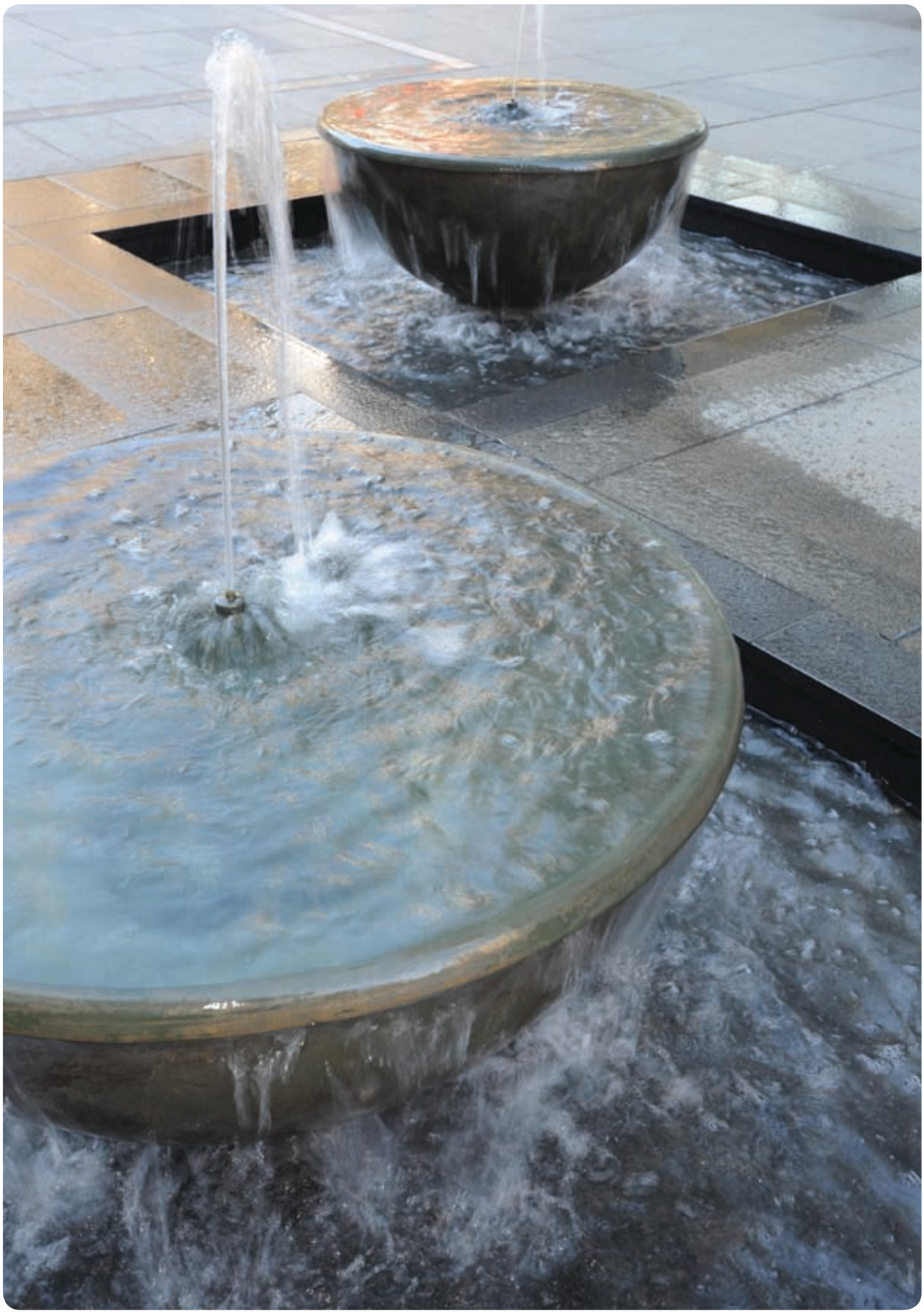
prone to wind drift. On gusty days, manually turn off the fountain as wind sensors don't always work well in these conditions.

- Use a gate valve in preference to a ball valve on the top up line and set it so that the feature tops up slowly. If a problem causes the top up to run continuously, less water will be wasted before the problem is detected and fixed.

Cleaning

- Reduce cleaning frequency and use biocides to stop microbial growth in the water. Ensure chemicals chosen can't corrode the water feature plumbing. Bromine is often used to stop microbial growth in water features because it has lower odour than chlorine. Bromine will corrode brass and copper pipes so PVC piping is recommended. PVC is also less expensive than copper.
- Detergents or foaming agents can damage rubber seals and cause leaks. They can also create a film on water level sensors which causes overflows. Anti foaming agents are effective if applied quickly. If foam is left to build up, all the water must be dumped and replaced.





Chapter 17

Saving water in the fire service tests

Property owners are legally required to test fire sprinkler booster pumps regularly to make sure they will work properly during a real fire. New procedures can ensure safety and improve water efficiency.

Many property owners test their systems every week. A single test can use up to six kilolitres of water in commercial buildings. In older buildings the water is pumped directly to stormwater or sewer. This means some buildings can pour over three megalitres of water straight down the drain every year.

The Fire Protection Association Australia says that test procedures allowed in *AS1851:2005 Maintenance of Fire Protection Systems and Equipment* can cut water use by nearly three-quarters compared to what was previously used in major high rise buildings (FPAA, 2007).

Procedures include testing monthly instead of weekly, reducing the time the system is tested at full load, system upgrades and improved maintenance (FPAA, 2007; Thomas, 2007)

Water can also be recirculated in the fire protection system during testing, captured and reused in the test system, or captured and reused for other purposes, such as garden irrigation. Non drinking water supplies may also be used for fire protection.

Staff may inadvertently use fire service water for cleaning and hosing out underground car parks and basements. This is not allowed. It is the Club Manager's responsibility to ensure staff do not use fire hoses for cleaning.

Sydney Water has stickers to remind visitors and staff not to use fire hoses for non-fire fighting purposes.

Figure 18 – Sydney Water fire hose stickers are available to EDC Business Program customers

Useful documents

Discussion paper – Conservation and sustainable use of water in fire protection systems, 2007, Fire Protection Association Australia, www.fpaa.com.au/technical/docs/Discussion%20Paper%20-%20Water%20Conservation%20-%20April%202007.pdf

Water conservation and sustainable use in fire protection systems, 2007, Roger Thomas, Tyco Water, www.fpaa.com.au/technical/docs/FA07-Water%20Conservation%20&%20Sustainable%20Use%20by%20Fire%20Systems.pdf

References

Fire Protection Association Australia (FPAA), *Discussion paper – Conservation and sustainable use of water in fire protection systems*, 2007, viewed 10 October 2008, www.fpaa.com.au/technical/docs/Discussion%20Paper%20-%20Water%20Conservation%20-%20April%202007.pdf

Thomas, R, *Water conservation and sustainable use in fire protection systems*, 2007, viewed 10 October 2008, http://www.fpaa.com.au/technical/docs/FA07-Water%20Conservation%20&%20Sustainable%20Use%20by%20Fire%20Systems.pdf

Chapter 18

Saving water in new and renovated clubs

Whether you're building a new club or renovating, water efficiency starts with good design. Making your club sustainable will save dollars later.

Make sure water and energy efficiency is included in the initial design brief to architects, designers and developers.

Sustainability can affect almost every aspect of building design and all your design consultants, builders and sub contractors need to understand your requirements.

Water efficiency

- Specify water efficient equipment for all parts of your new club building. This includes taps, toilets and showers, as well as big items such as swimming pool filters.
- Think about where you can catch rainwater and place rainwater tanks. What about stormwater harvesting systems? Is it possible to reuse greywater? Installing plumbing for alternative water systems is generally easier and cheaper to do during building than afterwards.

Energy efficiency

- Specify energy efficient equipment for all parts of your new club building. This includes heating and air conditioning, lights, lighting displays, fridges, freezers, vending machines and cooking equipment.
- Make sure your building is facing the best direction to maximise daylight and reduce the amount of heat gained on hot days. Design features like louvres, large eaves and high performance glass facades can cut solar heat gain. High windows and double glazed windows can let in light with little heat. The cooler your building, the smaller and cheaper your cooling systems can be. This will save water, energy and money over the entire life of your club building.
- A well designed building can take advantage of smaller and more efficient cooling and heating systems as described in Chapter 13. Make sure your architect thinks about heating and cooling from the start so that building design and layout can support efficient systems. Alternative cooling systems can use less energy and increase the amount of fresh air you can vent into the building.
- Can you put solar hot water systems on your roof, and photovoltaic cells to generate your own electricity?
- Use environmentally friendly and sustainable building materials wherever you can. Use locally made building materials that have low embedded energy and good thermal mass – such as clay bricks – instead of energy intensive materials which transmit a lot of heat – such as aluminium.

Landscaping

- Reduce the amount of hard outside surfaces around your club with features such as gardens, rooftop gardens and absorbent paving. This will reduce stormwater runoff and improve its quality. It will also reduce your club's impact on the surrounding environment, and improve the quality of any stormwater you capture and reuse.
- What kinds of landscaping are you going to use? Can it handle the extremes of hot, cold and dry likely to be experienced at your site. Are the plants you choose native to your local area, and how

are you planning to preserve any native vegetation on your site? Landscaped areas and green roofs can reduce the amount of heat reflected round your site, and reduce heat loads on your building.

Waste

- Reduce the amount of construction waste generated. Can you design your new building so that you incorporate elements of the existing building and recycle building materials? Can you design your building to reduce the amount of excavation needed on-site? This will reduce the amount of spoil generated and make environmental management of the building site easier.
- Incorporate waste recycling systems into the design of your building. Paper, metal, plastic and glass collection will be easier, safer and more effective if clean and safe collection and storage facilities are available. Perhaps you could also incorporate a compost system or worm farm to recycle organic waste.

Site access

- Think about site access. Is your club easy to get to by public transport, by foot and by bike, as well as by car? Is access safe and easy for all customers?

KPIs for new building performance

It may be useful to set specific KPIs when planning a new or renovated club.

For example, you may specify a 15% reduction in water and electricity use a square metre over your unrenovated building, or specify that the building must meet all best practice performance benchmarks outlined in this document.

Case study

Sustainable community buildings

The City of Sydney is using principles of living vegetation and thermal mass in its new Surry Hills Community Centre.

The building is designed with a green roof for effective insulation. Air is drawn into the building and filtered through a plant-filled glass atrium. It is then passed over high thermal mass rock baskets at the bottom of the building to moderate its temperature.

The air then flows throughout the different levels of the building. This process reduces the need for air conditioning and heating and improves air quality.

Tanks in the building also collect rainwater, and electricity is generated by solar cells. The building houses a library, childcare centre and community centre.

Case study
Green roofs

Green roofs are an excellent example of how considering sustainability at the building design stage can lead to a whole range of environmental benefits.

As the name suggests, green roofs are covered with vegetation. The benefits of green roofs include:

- better sound insulation (a 12 cm soil pad can reduce sound by 40 decibels)
- better heat insulation – heat loads in the building can be cut by eight per cent
- the amount of stormwater runoff is reduced and quality is often improved. Less money needs to be spent on stormwater detention tanks and treatment devices
- lower roof top temperatures help ensure that solar panels can operate in their best temperature range
- the life of rooftop structures is increased because they aren't being affected by heat and UV
- they are more attractive to look at and create habitat for urban animals
- they can help keep the surrounding area cooler
- pleasant outdoor spaces for customers and staff.

Green roofs have some special needs including:

- high quality water proofing and a root repellent system
- a drainage system
- filter cloth
- a lightweight soil or growing medium
- plants.

Australia's most famous green roof is on top of Parliament House in Canberra. The concept is gaining popularity in Australia, and has become an accepted building technique in Europe and the US.

The largest green roof in the world is on the Ford Motor Company's truck plant in Michigan. The roof is more than four hectares and is planted with 30,000 trees, plants and succulents. The green roof provides habitat, cuts the building's energy costs, and protects the roof membrane from extremes of hot and cold and UV damage.

For more information on green roofs visit

www.greenroofs.wordpress.com

www.greenroofs.org

Part 3
Alternative water sources

Part 3 of the ***Best practice guidelines for water efficiency in clubs*** gives advice on alternative water sources that may be used in clubs. Sydney Water recommends you first minimise your demand for water by following the advice in Chapter 5 before progressing to alternative water sources.

Chapter 19

Rainwater

Rainwater harvesting provides a readily available alternative water source. Using rainwater can cut demand for mains drinking water and reduce stormwater discharges from your site.

Rainwater collected from roofs generally has low levels of pollutants, especially if a first flush diverter is installed. This makes any required treatment simple and inexpensive, and increases the opportunities for reuse.

The bigger and cleaner your roof catchment area, the more likely it is you will be able to implement an effective rainwater reuse scheme.

Using rainwater

Harvested rainwater can be used for:

- toilet flushing
- washing machines
- water features
- garden irrigation
- outdoor cleaning and vehicle cleaning
- cooling towers.

While most rainwater has very low levels of dissolved solids and is suitable for cooling towers, ask your contractor for their help before using it in your cooling system.

NSW Health does not advise using rainwater for drinking when an alternative mains water source is available. Guidelines are available in the NSW Health document *Rainwater Tanks Where Public Supply is Available*. In most buildings drinking and cooking uses only a small percentage of total water used, so it's generally not cost effective to treat rainwater to drinking quality.

Rainwater must be used regularly to ensure tanks are emptied frequently and have enough room to capture more rainwater when needed. This will also increase the effectiveness of your tanks in reducing stormwater flows from your site. If you use rainwater regularly, it will maintain better water quality and treatment systems can be kept simple and inexpensive.

Case study
Harvesting rainwater at Darling Harbour

Since August 2006, the Sydney Harbour Foreshore Authority has saved more than four megalitres of drinking water a year by harvesting rainwater.

Sydney Harbour Foreshore Authority is a NSW Government agency that owns and manages some of Sydney's most popular harbourside areas, including Darling Harbour.

In the past few years, the Foreshore Authority has investigated opportunities to reduce water use. It identified the roof of the Entertainment Centre car park as an excellent source of high quality rainwater that could be easily harvested.

Rainwater is collected in 21 purpose-built tanks that are located in unused bays in the car park. The tanks hold up to 660 kL of water. Water is used to irrigate parks and gardens in Darling Harbour via a below-ground irrigation system.

The Foreshore Authority is aiming to reduce its drinking water use by 80% by 2020.

How much rainwater can you catch?

To make the most of your rainwater tanks it's important to get the right size tank for your needs and also consider the available area to capture rainwater.

To calculate the appropriate size tank, you will need rainfall and climate data as well as catchment area.

The Australian Bureau of Meteorology can give you average yearly rainfall data and mean number of rainfall days for your region. You can visit their website at www.bom.gov.au

You can calculate the theoretical maximum rainfall that can be captured by multiplying your roof area (in metres) by the average yearly rainfall (in metres).

Sydney Water's EDC Business Program team has developed a rainwater tank calculator. If you are an EDC Business Program member, talk to your Sydney Water representative about using it to help plan your tank installation.

Rainwater quality

The quality of rainwater collected will depend on the location in which it falls, the surface onto which it falls and the standard of storage tanks.

The roofs of clubs may collect contaminants like dust, leaves, vegetation, bird faeces and occasionally dead animals. Keeping roofs clean with regular maintenance will improve the quality of collected rainwater and reduce the likelihood that gutters and collection systems become blocked.

A 'first flush device' will also improve rainwater quality. This device sits between the roof downpipe and the rainwater storage tank and will dispose of the first rainfall runoff collected by your roof. As the first flush contains most pollutants, a properly sized first flush diverter is very effective

at improving the quality of collected rainwater.

To maintain water quality, it's a good idea to exclude roof areas that:

- have frequent public or vehicle access
- have unpainted lead flashing, copper roofing materials or bitumen paint
- are exposed to contaminants such as bleed from hot water heaters and air conditioners, and emissions from flues and chimneys or nearby industrial processes.

The inlet and overflow of the tank should have mesh covers and strainers to stop mosquitoes and other insects from getting into the tank and breeding. This will improve water quality and stop your tanks from causing a public health nuisance.

Rainwater collected from paved areas, including forecourts, footpaths, car parks and roads, generally contains far more pollutants. This is typically referred to as stormwater. Stormwater capture, treatment and reuse are covered in the next chapter.

Treatment

The greater the degree of human contact and the higher the chance of ingestion of the rainwater, the more effort you need to make to manage water quality and treatment systems.

Little or no treatment of water is needed if roofs and tanks are well maintained, the water is free of contaminants, and it is to be used for outdoor uses and toilet flushing. Some clubs may choose to treat rainwater further, especially if it is to be used indoors, to minimise any risk to customers.

Treatment systems are likely to be needed if rainwater is required for more sensitive uses and many people are likely to come into contact with it, or if there is a high chance of ingestion. The publications listed at the end of this chapter have more detailed information.

Regulatory requirements

If tank water is going to be used for toilet flushing or cooling tower operations, it will probably need top ups from mains water. In this case, you need to install a backflow prevention device at the property meter to ensure the rainwater cannot contaminate the mains water.

Plumbers should complete this work following the *NSW Code of Practice Plumbing and Drainage* and meet the specific technical requirements for rainwater tank plumbing detailed in *Guidelines for the installation of rainwater tanks on residential properties: part 1 plumbing requirements*.

For more information refer to Sydney Water's Plumbing Policy, Standards & Regulation group at plumbing@sydneywater.com.au

You should also contact your local council to discuss regulations that apply to installation of rainwater tanks, stormwater reuse systems, and greywater or blackwater reuse systems.

In New South Wales, property owners can install tanks of up to 10,000 L without development approval, providing set conditions are met for:

- siting and plumbing
- installing first flush diverters
- mitigating noise from pumps
- controlling mosquitoes.

To find out about these conditions, contact your local council and review the conditions in *State Environmental Planning Policy No. 4* at www.planning.nsw.gov.au/planningsystem/sepp1.asp

Larger tanks or tanks that do not meet these conditions usually need local council development approval.

Costs and benefits of rainwater tanks

Rainwater harvesting is a popular way to save drinking water, although it is usually less cost effective than other measures for reducing water use, such as leak reduction and improved efficiency.

However, rainwater is not governed by water restrictions and clubs can freely use it to irrigate parks and gardens, as long as the tank is not topped up with mains supply.

If rainwater is used for purposes such as toilet flushing, it can largely reduce mains water use.

Rainwater harvesting can also reduce stormwater discharges from large club sites, which can ease some of the negative environmental effects of urban stormwater.

Installing a large rainwater harvesting system in a new club building may reduce or remove the need to build an on-site detention system for stormwater.

Equipment and cleaning

You can improve the quality of stored rainwater, minimise the need for complex treatment systems and keep costs down by:

- cleaning your gutters regularly
- installing an adequately sized first flush device
- removing sludge from tanks every two to three years.

Tanks, gutter systems, pipework and warning signs should meet Australian standards.

To use tank water, you will need to install pumps to ensure enough operating pressure. You should include these costs in the overall cost of rainwater tank installation. Your plumbing contractor or hydraulic engineer can advise you.

Useful documents

NSW Health *NSW Health Private Water Supply Guidelines 2007*, www.health.nsw.gov.au/public-health/ehb/water/private_supplies.html

EnHealth, *Guidance on the use of rainwater tanks 2004*, www.enhealth.nphp.gov.au/council/pubs/pdf/rainwater_tanks.pdf

NSW Health, *Use of Rainwater Tanks Where a Public Water Supply is Available*, www.health.nsw.gov.au/policies/gl/2007/GL2007_009.html

Other resources

The Australian Environment Protection and Heritage Council is developing national guidelines for stormwater harvesting and reuse.


RAINWATER


VISITORS
BENCH RULES
Recycled Water
In Use
DO NOT DRINK

Chapter 20

Stormwater reuse

Rainwater that falls on hard areas, such as paving, footpaths, roads and car parks, is called stormwater. Using stormwater can cut mains drinking water use and reduce stormwater flows from urban sites.

Stormwater quality can be variable, and is generally not as high as rainwater collected straight from the roof. It is important to have a good idea of what activities take place in your stormwater catchment, and the types of pollutants they may introduce so you can manage your stormwater reuse project well.

Using stormwater

Harvested stormwater can be used to:

- flush toilets
- clean outdoor areas and car parks
- irrigate sports fields and gardens.

In general, it is easier to harvest stormwater if it is directed into a few major collection pipes.

The type of technology used to harvest, store and treat stormwater will depend on specific site conditions including:

- the size of your site
- expected local rainfall
- the level of likely stormwater contaminants
- the types of soils on-site
- the sensitivity of downstream environments.

Case study

Briars Hockey Club and Canada Bay Council save with stormwater

Stormwater is being captured and reused at the Olympic-standard Cintra Park hockey pitch in Sydney's inner west.

The hockey pitch was built as a training facility for the 2000 Olympics. It is owned by City of Canada Bay Council and managed by Briars Hockey Club.

The wet-based synthetic pitch must be kept saturated to reduce friction during play, and it is irrigated before games and during half-time. About six megalitres of drinking water was used to hose down the pitch and this, and any rainwater falling on the 6000m^2 pitch, was running off site through the stormwater system.

Stormwater is now diverted through dish drains, filtered to remove litter and leaves and stored in a modified 65 kL tank. As it's needed, water is filtered and UV disinfected before being stored in a 35 kL irrigation header tank ready for irrigation. The second filter removes suspended solids to ensure that the UV system works effectively. The council has also installed signs advising people not to drink the water.

To keep the system operating well, City of Canada Bay Council developed an operations manual that outlines how often cleaning and maintenance should be done.

In its first six months the project saved 2.6 ML of water. City of Canada Bay Council aims to save 4.5 ML of water a year, or 70% of the site's water needs. The system can also be topped up with drinking water if dry weather coincides with high demand from many hockey matches.

How much stormwater can you capture?

The amount of stormwater you can capture depends on yearly rainfall and catchment size. Precise calculations will depend on:

- the size of your catchment
- the type of ground surfaces and their absorbency
- the aspect and slope of your site
- the amount of rain that falls in each storm
- the amount of stormwater directed into stormwater pipes compared to how much flows overland.

Using on-site detention tanks

Sometimes stormwater can be harvested from existing on-site detention (OSD) tanks. Many clubs have been built with OSD tanks. These are designed to capture rainwater and stormwater after heavy rain and slowly release it to the main council stormwater system to prevent flooding.

Using your OSD tanks can make designing stormwater tanks easier because stormwater has already been diverted to one spot. Things to consider when planning to convert OSD tanks to stormwater harvesting tanks include:

- OSD tanks often take stormwater from paved common areas, footpaths, car parks and internal roads. This is likely to increase pollutants, including oil and grease in the captured water. This may limit the uses of harvested stormwater or it may need a more complex treatment system.
- It may be necessary to pre-treat stormwater from some areas before it is diverted to your storage tanks. For example, if litter is a problem, you can install a trash rack on some stormwater pipes to prevent litter polluting your harvested water.
- If you have multiple OSD tanks, investigate the catchment areas for each so you can decide the most appropriate use for water from each tank.
- Some councils do not allow reuse of water from OSD tanks because the water is needed downstream for environmental flows. Discuss plans with your council first.
- OSD tanks have been designed to detain water, rather than store it for long periods. The tanks will need to be modified, and you will need to check that the tank meets engineering standards for water storage.

Stormwater quality

Stormwater quality can be variable, and will depend on what activities take place in your stormwater catchments. In built-up areas, stormwater contaminants may include oils and grease, chemicals and metals, litter, sediments and harmful pathogens.

There are a number of ways to improve the quality of your stormwater and save on treatment costs:

- Keep catchment areas clean by regular car park or street sweeping, litter patrols and litter prevention campaigns.
- Make sure operations on your site, such as garbage storage and collection, building and excavation works, are well managed.
- If necessary, exclude areas such as car parks or garbage collection zones that are likely to introduce a lot of pollutants.
- Install trash racks or gross pollutant traps on stormwater pipes to reduce pollutant loads.

Treatment

As with all alternative water sources, the amount of treatment needed will depend on the quality of wastewater, and the likelihood of human contact with the stormwater when it's used.

If you manage a clean catchment with few polluting activities, intend using stormwater for irrigation, aren't storing the water for long, and can limit human access during irrigation, your treatment system can probably be fairly simple and inexpensive.

Internal uses, such as toilet flushing, will need a more comprehensive treatment and management system because of the risks of plumbing cross connections and ingestion of water.

If stormwater is very heavily polluted, or if activities in your catchment are hard to manage and likely to introduce pollutants, you can refer to the treatment information in Chapter 22.

Regulatory requirements

If you use stormwater for purposes that need top up from mains water, you must prevent contamination of the mains supply by installing a backflow prevention device at the property meter.

Plumbers should complete this work following the *NSW Code of Practice Plumbing and Drainage* and meet the specific technical requirements for rainwater tank plumbing detailed in *Guidelines for the installation of rainwater tanks on residential properties: part 1 plumbing requirements*.

For more information refer to Sydney Water's Plumbing Policy, Standards & Regulation group at: plumbing@sydneywater.com.au

You will need to consult your local council about regulations that apply to installing stormwater storage dams or tanks and extracting water from the environment, installing treatment equipment and pumps, and any alterations to existing on-site detention systems.

Costs and benefits

Costs of stormwater capture include pretreatment, piping, collection, treatment and reticulation of treated water. As stormwater catchments and stormwater quality vary, cost calculations should be made for each individual project.

Reusing stormwater can reduce some other development and maintenance costs. Reusing stormwater on-site can:

- reduce the required size of stormwater discharge pipes
- reduce or remove the need for on-site detention systems
- reduce developer fees that are levied to maintain the trunk stormwater system
- reduce the need to install and maintain 'end of pipe' treatment systems, such as gross pollutant traps.

Useful resources

The Australian Environment Protection and Heritage Council is developing national guidelines for stormwater harvesting and reuse.

Information on the guidelines and draft documents are available at www.nepc.gov.au/taxonomy/term/39

3

Chapter 21

Groundwater

Groundwater, sometimes known as bore water, may be an alternative source of water for some clubs.

Using groundwater

One of the most common uses of groundwater is for irrigation. Some clubs in Sydney have approved licenses for groundwater extraction, ranging from one – 400 ML/year.

The quality of groundwater can be variable, and the costs to access it will depend on the depth at which it is found and local geography.

The NSW Department of Water and Energy (DWE) keeps a groundwater database of registered bores in NSW. DWE can give you general information about the likely quality of water based on nearby bores.

It is important to consider the effect groundwater can have on soil quality as it may contain high levels of dissolved salts. Some soils may be more sensitive than others, and it is advisable to do have a soil analysis done.

Groundwater can also be used in cooling towers. Pretreatment may be needed to reduce the levels of dissolved salts.

Groundwater can also be used to flush toilets and urinals. The University of NSW uses groundwater in some of its amenities. It has also trialled the use of groundwater in cooling towers.

Before using groundwater consider:

- how much groundwater you need
- if groundwater can deliver a sustainable amount of water
- what treatment it may need
- other land uses in the groundwater catchment and the potential for contamination
- what approvals you need before drilling a bore and using groundwater.

Groundwater quality

The quality and properties of groundwater will affect the range of end uses available. It is important to note that quality varies from one site to another.

The common dissolved solids found in groundwater include dissolved iron, manganese and hydrogen sulphate. You should also investigate the groundwater's pH and if it is likely to cause corrosion or scaling if it's not treated before use.

The type of treatment will depend on the particular properties of the groundwater you extract and the sensitivity of its uses.

Regulatory requirements

DWE regulates access to groundwater in New South Wales. Before you sink a bore, you must first obtain approval and a licence for the works from DWE. A licensed driller must construct all bores.

There are embargoes in place for commercial use of groundwater in some areas around Sydney. These include the Botany Sands aquifer in the Eastern Suburbs and around Botany Bay, as well as the Hawkesbury sandstone aquifer in the Blue Mountains and parts of the Southern Highlands. These embargoes do not allow DWE to accept new water licenses. Contact DWE for details about embargoes.

Chapter 22

Wastewater reuse

Wastewater can be a valuable and reliable alternative source of water. It needs careful management and treatment before it can be reused as it contains a range of contaminants.

Wastewater is generally described by three different terms:

1. **Greywater** includes wastewater from hand basins, showers and laundries. Greywater may be contaminated by human waste. Kitchen wastewater may also be regarded as greywater. Its treatment and reuse is more complex because it may be alkaline and can contain large amounts of grease, fat, food waste and detergents.
2. **Blackwater (domestic sewage)** is wastewater from toilets and bidets that is heavily and directly contaminated with human waste and solid materials such as toilet paper. Black water is likely to have high levels of bacterial contamination and can be highly infectious.
3. **Sewage** is a combination of black water and greywater, as well as trade wastewater from commercial and industrial activities.

Using greywater

Greywater with levels of pathogen contamination, oil and grease can be used for below ground irrigation with little treatment. Greywater can be used for above ground irrigation and indoor uses such as toilet flushing, if you use higher levels of treatment.

Before reusing greywater:

- calculate how much greywater you generate and how much you can reuse
- identify the contaminants in your greywater
- decide on intended uses for greywater such as irrigation or toilet flushing
- determine how much contact people will have with reused greywater
- identify any environmental risks associated with greywater reuse
- decide on the treatment processes you will use, and ensure they will remove contaminants and make water safe for users and the environment.

Preventing hazardous contaminants from going into a greywater system is the best way to ensure greywater quality. This can be done by:

- excluding kitchen waste because of high levels of oil, grease and bacterial contamination from food waste, unless your system is specifically designed to handle these contaminants.
- excluding laundry water when items soiled with faeces or vomit are washed, as they have high levels of bacterial contamination
- ensuring household and garden chemicals are not disposed of into greywater because chemicals can harm soils and the environment.

It's important to communicate with building users and cleaners to help them understand what can be put down the drain and when water must be diverted to the sewer.

If you plan to use greywater for irrigation, you must ensure the receiving soils can hold the volume of water. To find out the water holding ability of your soils, you may need to get a suitably qualified consultant to carry out a soil assessment.

There are two types of devices commonly available to reuse greywater:

1. **Greywater diversion devices.**
2. **Greywater treatment devices.**

Greywater diversion devices

If you are confident that your greywater system does not collect kitchen wastewater or contain heavy pathogen loads, you can use a greywater diversion device to divert greywater to below ground irrigation.

Below ground greywater irrigation systems must be installed at least 10 cm underground to reduce human exposure to potential pathogens.

Diversion devices are not allowed to store greywater because harmful pathogens can grow in storage tanks and unpleasant odours can develop. Any greywater that is not used for irrigation must be disposed of to sewer. To avoid waterlogging your soil, don't apply greywater after rain. Diversion devices must have a screen to remove any large pollutants, such as lint or twigs, which could clog spray systems or pumps.

Greywater must be diverted to sewer if there is a known source of faecal contamination in the system, or an outbreak of infectious disease amongst users of the buildings where greywater is sourced.

Diversion devices can be operated by gravity or pump. Pump devices have a surge tank that controls the amount of greywater sent to irrigation. The surge tank should not be used as a storage tank.

Greywater treatment systems

A treatment system must be used if greywater contains kitchen wastewater, or if you want to use greywater for toilet flushing, washing machines or unrestricted garden irrigation.

A complete greywater treatment system may include components such as:

- greywater septic tanks
- aerated wastewater treatment systems
- intermittent sand filters
- soil filters
- wetlands.

These processes remove pollutants including solids, but only the aerated wastewater treatment system removes harmful bacteria.

Disinfection is needed where there is human contact with reused greywater. When secondary treated greywater is disinfected, using active disinfection such as chlorine, bromine, ozone or ultra violet light, it will reduce the levels of harmful bacteria and make greywater safe for uses where there will be more human contact.

Using black water and sewage

The amount of greywater generated on-site can sometimes be insufficient to fulfil demand for reused water. It may be more efficient to use black water or sewage. While these wastewater streams are more heavily contaminated and need more treatment, having access to a larger amount of wastewater may be more cost effective.

Building owners can either use the sewage generated on-site, or access nearby sewer mains. Accessing wastewater in nearby mains is known as sewer mining. If businesses are accessing sewer from Sydney Water's mains, they will need approval from Sydney Water and their local council.

Clubs that want to sewer mine should discuss their plans with Sydney Water to make sure the project is possible and the existing sewer infrastructure can cope with the proposed project. If the project is possible, Sydney Water will provide initial development and construction approvals.

Case study

Blacktown Workers Sports Club wastewater reuse

Blacktown Workers Sports Club is using recycled wastewater to irrigate over 20 ha of playing fields including soccer fields, cricket ovals, bowling greens and tennis courts.

To keep all its playing fields in good condition during drought and periods of water restrictions, the club built an on-site treatment system to treat its wastewater for irrigation. Water is treated with a membrane bioreactor and disinfected with ultra violet light.

Blackwater and greywater provide seven to 10 kL of wastewater a day. This is treated and used to irrigate playing fields using pop-up sprinklers two or three weeks out of every four.

Dam water is used on alternate weeks to ensure nitrogen and phosphorus levels don't get too high.

The introduction of wastewater recycling has seen the club cut its use of drinking water by nearly half.

Case study
Ashlar Golf Club wastewater reuse

Ashlar Golf Club in Blacktown has been using recycled water since 1974. The club uses up to 200 ML of recycled water every year from Sydney Water's Quakers Hill Sewage Treatment Plant.

Recycled water is used for irrigation and equipment wash down. The water is aerated and chemicals are added to prevent the build up of sodium and bicarbonates which would affect soil structure and fertility.

The club has installed an automatic irrigation system that allows the course supervisor to log in from anywhere and activate the sprinklers when necessary. This enables irrigation to be scheduled around rainfall to prevent waterlogging of soils.

The greatest benefit for the club has been the ability to keep the golf course in prime condition despite drought and water restrictions. The club has also enjoyed lower operating costs.

Regulatory requirements

In NSW, local government approval is needed to install and operate sewage maintenance systems that service more than one household. This also applies to greywater reuse systems.

Your local council may give approval under the *Local Government Act 1993 and Regulations*. DWE and NSW Health may advise local councils when they are processing applications.

Local government approval is not needed where an environmental protection licence is already in place under the *Protection of the Environment Operations Act 1997*.

Recycled water schemes should meet the *Australian Water Recycling Guidelines: Managing Health and Environmental Risks (2006)* and the *Interim NSW Guidelines for the Management of Private Recycled Water Schemes*. Refer to www.waterforlife.nsw.gov.au/recycling/guidelines for a full list of appropriate water recycling guidelines.

Risk management and treatment

To manage the risks of a recycled water system and to gain approval to install and operate one, you need to follow the steps in Table 17 below.

Conduct a risk assessment	A risk assessment will identify likely health and environmental risks in the sources of wastewater and its intended uses. This will guide you to design a treatment system that will produce appropriate quality water that's safe for users and the environment.
Include multiple barriers	Multiple barrier treatment systems can produce high quality water and provide multiple points to remove pollutants. The types of barriers used will depend on the contaminants in the source water and the sensitivity of its intended uses. Examples of barriers include: • restricting your wastewater sources to avoid hazardous pollutants • filtering wastewater with a membrane • chemical treatment • restricting access to recycled water • installing signs.
Disinfect to remove harmful pathogens	Wastewater should be disinfected to ensure all harmful pathogens are removed. Substances such as chlorine and bromine provide residual disinfection that prevents regrowth of harmful bacteria for some time. UV and ozone disinfect but do not provide residual disinfection.
Identify the critical control points	Critical control points (CCPs) are steps or procedures in your recycled water system that are essential to remove a water quality hazard or reduce hazards to acceptable levels. Numerical limits should be set for each CCP so managers of your water system can monitor the system, ensure that it's operating correctly and take corrective action if necessary.
Develop a system management manual	A system management manual should be developed so everyone involved with the system knows: • how it works • who is responsible for managing it • how to respond to alarms or malfunctions • how to report on system performance. A draft system manual should be submitted to your local council with your initial application. It should be updated when the results of system testing and validation are known.

Test the system	If your local council approves installation of the system, the system's performance must be tested over 12 weeks to make sure it is working correctly and is producing water of acceptable quality. During this time, treated water should be disposed of to sewer. After approval to operate is given, an additional four weeks testing is needed to make sure the system is operating as expected.
Set alarms	Critical control points in the system should be monitored continuously. Alarms on critical control points should be established so that system operators are alerted if water quality targets are not met, or if parts of the system stop operating. Water from the system should be immediately diverted to sewer.
Responsibility	Clear responsibility should be given to a person or organisation to manage the system.
Signage	Install signs and colour coded plumbing pipes and fixtures. This will help stop human access to recycled water and operate as an additional barrier. Conduct regular plumbing compliance checks to detect cross connections.
Comply with plumbing requirements	If your wastewater reuse system is in Sydney, tell Sydney Water's Plumbing & Policy team about any changes to your plumbing. Sydney Water will review your system to make sure there are no potential health threats or impacts on the drinking water system. Talk to your Sydney Water trade wastewater representative to make sure there are no changes to your trade wastewater agreement.

Table 17 – Managing the risks of a recycled water scheme

Useful documents

Water for Life – recycling guidelines www.waterforlife.nsw.gov.au

NSW Government Department of Water and Energy, *Interim NSW guidelines for management of private recycled water schemes*, May 2008, www.waterforlife.nsw.gov.au

National Resource Management Ministerial Council (NRMMC), Environmental Protection and Heritage Council (EPHC) and Australian Health Ministers Conference (AHMC), *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) – November 2006*, 2006.

NSW Health, Advisory Note 4 – *Sewage Management Facility Accreditation Criteria Based on the Final Application of Treated Effluent and Risk of Disease Transmission*, 2006, www.health.nsw.gov.au/resources/publichealth/environment/water/adnote4_pdf.asp

Costs and benefits

Wastewater can provide a regular source of alternative water. Well run systems can largely reduce demand on mains water supply.

The costs of installing and running greywater treatment systems are often lower than black water and sewage reuse costs. However, the higher volume of black water and sewage that is available to clubs can make these systems more viable.

It can be time consuming and costly for clubs to design systems to meet regulatory and health requirements, test them, and maintain and monitor them.

Given the costs of setting up a well running wastewater reuse system, it's important you have an accurate idea of how much wastewater you will be collecting, and how much you will be using. If you make your club as water efficient as possible, you will be able to keep the size of any water reuse scheme small and reduce your capital and operating costs.

References

Environmental Protection and Heritage Council (EPHC), *National Water Quality Management Strategy – Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) – November 2006*, 2006, www.ephc.gov.au/sites/default/files/WQ_AGWR_GL_Managing_Health_Environmental_Risks_Phase1_Final_200611.pdf

NSW Health, *Advisory Note 4 – Sewage Management Facility Accreditation Criteria Based on the Final Application of Treated Effluent and Risk of Disease Transmission*, 2006, www.health.nsw.gov.au/resources/publichealth/environment/water/adnote4_pdf.asp

Environmental Protection and Heritage Council (EPHC), *Australian Guidelines 21 For Water Recycling: Managing Health And Environmental Risks (Phase 2) Augmentation of Drinking Water Supplies* (Draft For Public Comment July 2007), 2007, www.ephc.gov.au/pdf//water/AugmentationofDrinkingWaterSupplies_ConsultationDraft_July07.pdf

Part 4

Water saving checklist

Part 4 of ***Best practice guidelines for water efficiency in clubs*** gives a practical checklist to show how well you manage water. The checklist will help you work your way through the practical aspects of the guidelines and identify opportunities for water efficiency in your club.

Water efficiency checklist

Being water efficient in your club can improve your environmental footprint and save money . This checklist will help you identify opportunities to become more water efficient in your club.

Managing your water	Yes/No	Recommended action
Is someone responsible for water efficiency in your club?	Yes ☐ No ☐	If No, appoint someone with responsibility for water efficiency. Make sure it is included in their job description.
Do you monitor and record your water use?	Yes ☐ No ☐	If No, read your meter at least weekly, or install a continuous monitoring system. Record meter reading information so you can identify changes in water use. Install sub meters on large water-using equipment or water intensive parts of your club.
Do you review your sub meters or information from your continuous monitoring system regularly?	Yes ☐ No ☐	If No, make sure one staff member is responsible for water use information and knows what they need to do if water use changes.
If you conduct manual meter readings, do you check for base flow or overnight leaks?	Yes ☐ No ☐	If No, read meters at close of business and before the start of business in the morning. Do this at least once every three months.
Do you benchmark your water use?	Yes ☐ No ☐	If No, calculate how many litres of water each customer uses a day and compare it against past performance and the benchmarks in Chapter 3.
Do you know where water is used in your club?	Yes ☐ No ☐	If No, undertake a water efficiency audit. See Chapter 8.
Do you have a water efficiency plan? This is a list of projects from the most effective to the least.	Yes ☐ No ☐	If No, use the results of this checklist and your water audit to create a list of projects. Include the ideas of staff. A plan can include leaks to be fixed, sub meters to be installed and, upgrades to be undertaken. You can use price and likely water savings to rank them.

Do you regularly review your club's dedication to good water management?	Yes ☐ No ☐	If No, use the One-2-Five® Water or Water Achiever process offered through the EDC Business Program and implement the critical actions. Compare your results to previous reviews to assess how much you have improved.
Do you know how much your club has to pay for water and all its associated costs (energy, pumping, chemical, sewer discharge)?	Yes ☐ No ☐	If No, refer to information about the true cost of water in Chapter 4. Calculate your own water costs and associated charges. When you know your water costs, you can establish a business case for water efficiency.
Do your staff undertake regular inspections of water-using equipment?	Yes ☐ No ☐	If No, conduct routine inspections and program maintenance to detect problems before they become large leaks.
Do you have signs, posters and stickers in your club to encourage water efficiency and remind people to report leaks?	Yes ☐ No ☐	If No, business partners in the EDC Business Program can access co-branded stickers, posters and shower hangers.
Amenities	**Yes/No**	**Recommended action**
Have you installed sub meters on supply lines to amenities and hot water supply?	Yes ☐ No ☐	If No, install sub meters on supply lines to amenities, as described in Chapter 7.
Does your club have any cyclic flushing urinals?	Yes ☐ No ☐	If Yes, replace urinals immediately with manually flushing urinals, automatic on-demand sensor units or ultra low flow or waterless urinals. Refer to Chapter 11.
Does your club have automatic on-demand urinal sensor flushing systems?	Yes ☐ No ☐	If Yes, regularly check that sensors are working properly and are not detecting general bathroom traffic. Check that solenoids are operating correctly and replace them if they are faulty or worn.
Does your club have single flush toilets?	Yes ☐ No ☐	If Yes, replace single flush toilets in high use areas with 6/3 L or 4.5/3 L dual flush models. If toilets are in low use areas, restrict cistern volume and bring forward programmed replacement.
Does your club have dual-flush toilets?	Yes ☐ No ☐	If Yes, check the flush capacity. Older 11/5.5 L and 9/4.5 L dual flush toilets can be replaced with new 6/3 L or 4.5/3 L flush models.
Are cistern rubber seals on toilets replaced regularly?	Yes ☐ No ☐	If No, cistern rubber seals should be replaced every 18 months to two years to prevent leaks.

Do you have a flusherette system?	Yes ☐ No ☐	If Yes, check the flow rate and flush timing. Over time, wear will cause excessive flush volumes. Insert flow control regulators into valve bodies to reduce flow.
Do you have flow regulators in all hand basins?	Yes ☐ No ☐	If No, install flow regulators so that flow is reduced to a maximum of six litres a minute. Alternatively, install WELS 5 or 6 star rated taps or better.
Do you have water efficient showers?	Yes ☐ No ☐	If No, install flow regulators so that flow is reduced to a maximum of nine litres a minute or install WELS 3 star rated showerheads.
Kitchens and restaurants	**Yes/No**	**Recommended action**
Are the water supply lines to restaurants sub metered?	Yes ☐ No ☐	If No, install sub meters on the supply lines to food businesses, especially high volume, water intensive kitchens.
Do you benchmark water use in your club's restaurants?	Yes ☐ No ☐	If No, use sub metering information to establish benchmarks so you can track restaurant water use over time. Common benchmarks are litres a cover, litres a meal served, or litres a customer.
Do you have flow regulators on kitchen sinks and basins?	Yes ☐ No ☐	If No, install 9 or 12 L/min flow restrictors on kitchen sinks and six litres a minute restrictors on hand basins.
Do you have waterless woks in your kitchen?	Yes ☐ No ☐	If No, consider installing waterless woks in Asian style restaurants. You may be able to get information and financial assistance from the Ethnic Communities Council of NSW. Contact wok@eccnsw.org.au
Do you have a water efficient dishwasher?	Yes ☐ No ☐	If No, replace your existing model with a water efficient model. You will save money through water and energy savings.
Do kitchen staff operate dishwashers and glasswashers efficiently?	Yes ☐ No ☐	If No, ensure all staff receive information about water efficient dishwasher operation.
Do kitchen staff rinse plates before washing?	Yes ☐ No ☐	If Yes, install water efficient six litres a minute WELS rated pre rinse spray valves. Sydney Water is offering a rebate for their installation. See Chapter 12.
Do kitchen staff leave taps running while they are cooking and cleaning?	Yes ☐ No ☐	If Yes, install signs to remind staff to turn taps off. Consider installing sensor taps or foot operated taps. Waterless woks have hip controls and automatic turn off swivel taps.

Are kitchen floors and food court areas hosed down?	Yes ☐ No ☐	If Yes, ensure hoses are fitted with trigger nozzles. Consider using mops or squeegees instead.
Is food ever defrosted under running water?	Yes ☐ No ☐	If Yes, defrost food in a refrigerator. You can also defrost in a microwave if the food is to be cooked immediately.
Are water-cooled steamers used?	Yes ☐ No ☐	If Yes, install more efficient steamer equipment. Efficient steamers can use up to 90% less water and up to 60% less energy than older models. They have shorter cooking times, higher production rates and lose less heat.
If you have a water-cooled ice maker, is it a 'one-pass' system?	Yes ☐ No ☐	If Yes, replace it with an air-cooled model, or a water-cooled model with an evaporative condenser.
Cooling tower operations	**Yes/No**	**Recommended action**
Does your club have cooling towers?	Yes ☐ No ☐	If Yes, continue with this section. If No, go to the next section.
Have you contacted your water treatment contractor to discuss increasing the cycles of concentration in your cooling tower to reduce the bleed rate?	Yes ☐ No ☐	If No, ask your contractor to do so. Water supply in Sydney can usually be cycled to at least nine. If your contractor is unable to do this, discuss opportunities to change to a treatment system that can function effectively at high cycles of concentrations.
Does your cooling tower water treatment contract require the contractor to report all water leaks after each service?	Yes ☐ No ☐	If No, amend the contract to ensure this occurs.
Do you have a certificate stating that an effective process of cooling tower disinfection is installed and operating?	Yes ☐ No ☐	If No, make sure your contractor can supply one. These certificates are mandatory in New South Wales.
Does your cooling tower contractor give clear reports that show when you must act to improve the operation of cooling towers?	Yes ☐ No ☐	If No, ask them to highlight in their written reports when you need to take action and ask them to follow up with a phone call.
Is there a water meter on the make up water pipe?	Yes ☐ No ☐	If No, install a sub meter and monitor the water use regularly.

When the pump is stopped, is there water flowing from the overflow drainpipe?	Yes ☐ No ☐	If Yes, check that the drain valve is correctly set, closed and properly sealed, and if there are any leaks.
When the pump is stopped, does water flow from the overflow drainpipe while water is coming in through the make up water line?	Yes ☐ No ☐	If Yes, this shows that the ball float valve is incorrectly set and needs to be reset.
If you have a V shaped basin, when the pump stops does the cooling tower overflow?	Yes ☐ No ☐	If Yes, consider installing a break tank, or a more precise make up control.
If there is a large length of condenser water pipe work running at high level, does it cause the tower to overflow when the pump stops?	Yes ☐ No ☐	If Yes, consider reconfiguring the pipe work.
If you have two or more cooling towers interconnected, when the pump stops does water flow from the drainpipe?	Yes ☐ No ☐	If Yes, check the ball float valve settings and the height of the tower basin. If one basin is higher than the other, some modifications may be needed.
Is water flowing over the edge of the tower basin?	Yes ☐ No ☐	If Yes, check that the overflow pipe is set correctly or not blocked.
Are there leaks from the tower, casing, basin, or any intake or exhaust ducts or flexible connectors?	Yes ☐ No ☐	If Yes, joints need to be adjusted and sealed.
Does the cooling tower have drift eliminators?	Yes ☐ No ☐	If No, install a drift eliminator that limits drift loss to no more than 0.002%.
Do any pumps have packed gland pump seals?	Yes ☐ No ☐	If Yes, ensure pumps are inspected monthly and seals tightened as needed. Consider replacing the seals with mechanical seals.
Does your water treatment contractor clean the conductivity sensor every month?	Yes ☐ No ☐	If No, make this part of their ongoing duties. Ensure the sensor is recalibrated every month.
Is the water treatment system installed with a bleed block-out?	Yes ☐ No ☐	If No, install a bleed block-out to ensure that unnecessary bleed does not happen during chemical dosing.

Does the cooling water system have a side stream filter that uses water for back flushing purposes?	Yes ☐ No ☐	If Yes, consider capturing the bleed-off in a backwash holding tank and using it to backwash the side stream filter.
Cooling systems and building design	**Yes/No**	**Recommended action**
Have you integrated economy cycle or fresh air venting into your air conditioning system?	Yes ☐ No ☐	If No, investigate if this can be done with your current heating, ventilation and air conditioning (HVAC) equipment.
Have you reduced the heat load in your building as far as possible?	Yes ☐ No ☐	If No, install energy efficient lighting, high performance building insulation, external shading, sympathetic landscaping, and heat efficient natural lighting. Refer to *Sydney Water's Best Practice Guidelines for cooling towers* and *Best Practice Guidelines for commercial buildings*.
Is your cooling load under 500 kWR?	Yes ☐ No ☐	If Yes, investigate the possibility of air-cooled systems. In smaller systems, these can be appropriate because they do not use water and have lower maintenance costs.
Have you looked at alternative water sources for your cooling system?	Yes ☐ No ☐	Groundwater, reclaimed water, recycled water, rainwater and condensate may all be used in cooling systems.
Have you considered other cooling systems?	Yes ☐ No ☐	If No, investigate viable alternatives to traditional cooling towers when building or renovating such as: • replacing evaporative precooled air cooled condensers with pad or spray cooling • variable refrigerant volume systems • hybrid coolers or condensers • phase change materials • chilled beam technology.
Swimming pool	**Yes/No**	**Recommended action**
Does your club have a pool?	Yes ☐ No ☐	If Yes, continue with this section. If No, go to gyms.
Do you have a sub meter on the pool water supply?	Yes ☐ No ☐	If No, install a sub meter to track water use in the pool.
Do you have a pool cover? Is it used?	Yes ☐ No ☐	If No, buy and use a pool cover. Pool covers save water and energy, especially in heated pools.
Do you benchmark pool water use?	Yes ☐ No ☐	If No, develop benchmarks as described in Chapter 14 and compare them to the best practice benchmarks shown.

Gyms	Yes/No	Recommended action
Does your club have a fitness centre?	Yes ☐ No ☐	If Yes, continue with this section. If No, go to outdoor areas.
Are the showers water efficient?	Yes ☐ No ☐	If No, install nine litres a minute flow restrictors or WELS 3 star rated showerheads.
Do you have flow regulators in all hand basins?	Yes ☐ No ☐	If No, install flow regulators so that flow is reduced to six litres a minute or less.
Outdoor areas and water features	**Yes/No**	**Recommended action**
Do you have a landscaped area or water features?	Yes ☐ No ☐	If Yes, continue with this section. If No, go to steam systems and boilers.
Do you sub meter your irrigation supply and water features?	Yes ☐ No ☐	If No, consider installing sub meters to determine your water use and identify leaks. This is especially important if you have large irrigated areas or large water features.
Do you improve your soils?	Yes ☐ No ☐	If No, add organic matter such as compost or composted animal manure. Improving soil quality can improve plant growth and water retention. Refer to Chapter 15.
Do you use an alternative water source to irrigate your outdoor areas?	Yes ☐ No ☐	If No, consider using rainwater, stormwater or treated wastewater for irrigation.
Steam systems and boilers	**Yes/No**	**Recommended action**
Do you have a boiler system?	Yes ☐ No ☐	If Yes, continue with this section. If No, go to cleaning.
Do you sub meter your boiler?	Yes ☐ No ☐	If No, consider installing sub meters to determine your water use and identify leaks.
Do you inspect steam system valves and traps yearly?	Yes ☐ No ☐	If No, consider inspecting steam system valves and traps at least yearly and conduct pro active maintenance.
Cleaning	**Yes/No**	**Recommended action**
Do you communicate with cleaning staff regularly?	Yes ☐ No ☐	If No, cleaning staff will need information about water wise cleaning techniques and the correct way to clean specialised equipment such as waterless urinals. You can use Sydney Water EDC Business Program stickers, posters and fact sheets to help communicate with staff.
Do cleaners hose down floors or car parks?	Yes ☐ No ☐	If Yes, water wise rules don't allow the hosing of hard surfaces. Use brooms or mops to clean floors, or use rainwater or other water sources if you must use the hose. In most large car parks, commercial streets or footpaths, cleaning equipment can be used.

Appendix 1

Sydney Water benchmarks explained

The EDC Business Program developed the water efficiency benchmarks presented in Chapter 3 from 30 water efficiency audits conducted on clubs in Sydney. Audits were conducted between 2002 and 2004.

Audits included a range of clubs. There were:

- 14 RSL clubs
- seven leagues clubs
- nine community or special interest clubs.

Daily water use ranged between 32 kL to 226 kL a day. Clubs varied from inner city sites without gardens or sports facilities to large clubs with extensive outdoor sports fields.

Water use targets were developed by subtracting all water savings that could be achieved with a payback of less than two years from current use.

A benchmark of a litre/customer/day was set because it enabled comparison across the different types of clubs in the sample.

There is a marked trend of higher water efficiency as customer numbers increase. This may be because there is a base load of water involved with operations, such as cooling and cleaning a building. Doubling the number of customers directly increases use of amenities and kitchens, but only creates a minor increase in the amount of water used for cooling towers and cleaning. Therefore, it appears that the more people that use a club, the more efficient it becomes.

The graphs presented in Chapter 3 show irrigation is only a small part of a club's water use. There are a number of reasons why:

- Almost half the clubs audited did not irrigate at all because they don't have outdoor landscaped areas, sports fields or greens. Among clubs which did irrigate, the proportion of water used ranged from one per cent to 16%, with an average of three per cent.
- One quarter of the clubs audited used less than five per cent of their daily water use for irrigation because they only have small gardens or bowling greens.
- Nearly a quarter of clubs did not irrigate during the audit period because of water restrictions. It is likely that clubs have adapted to water restrictions by accessing alternative water sources or accepting a different quality of landscaping.
- Water use figures are based on mains supply water. Some clubs use water from dams and tanks to irrigate and this is not indicated in water use figures.

Improving irrigation practices in clubs is still important. Chapter 15 shows how clubs can boost the quality of their landscaped areas by improving soils, irrigation practices and plant selection. Even if water restrictions change, it is still important to make the most efficient use of irrigation water. These guidelines also provide irrigation benchmarks to allow you to compare your site to best practice.

Glossary

Backflow	The unwanted reverse flow of water into the drinking water system.
Base flow	A continual flow of water noted by monitoring systems. Base flow is most obvious in businesses that shut down overnight. Some base flow can be justified, for example cooling towers running overnight to cool essential electrical equipment that can't be turned off. If base flow can't be explained, or is more than it should be, it is likely there is a leak. Typical causes include cyclic flushing urinals running overnight, cooling towers running all night or leaking toilets.
Benchmarks	A measure of industry or organisational best practice. You can measure your performance against industry best practice by using KPIs for key water-using processes.
Bleed	The water that is removed from a cooling tower and replaced with clear make up water to reduce the concentration of dissolved and suspended solids in the system.
Cooling load	The amount of heat which needs to be removed to keep an occupied building at a set temperature, and the energy needed to do this.
Covers	Numbers of guest meals or refreshments served.
Cycles of concentration	The number of times the concentration of dissolved and suspended solids in cooling tower water is increased due to evaporation. For example, four cycles of concentration means the concentration of solids has been increased by four.
Drift	Water lost from a cooling tower as liquid droplets within the exhaust air. Drift does not include condensation.
GL	Gigalitre. One billion litres.
HVAC	Heating, ventilation and air conditioning.
kL	Kilolitre. One thousand litres.
KPI	Key Performance Indicator. These are quantifiable measurements of water use that help your club measure how well it is achieving its water saving goals.

kWh	Kilowatt hour. A power demand of one kilowatt (1,000 watts) for one hour.
Legionella	Legionella bacteria can cause a type of pneumonia called Legionnaires Disease. Legionella bacteria can multiply rapidly in wet, warm conditions.
Loam	Fertile, well-draining soil with a balanced mixture of sand, clay, silt and decomposed organic matter.
Lumens	The amount of light being produced by a globe or light.
Microclimate	Specific local conditions that affect temperature, rainfall, shade and soil moisture.
MJ	Megajoule. One million joules.
ML	Megalitre. One million litres.
One-2-Five® Water	A management diagnostic process that analyses qualitative or non-technical measures that all businesses must address to achieve sound water management. One-2-Five® is facilitated by Energetics Pty Ltd.
On-site detention	A method of capturing stormwater from buildings and urban sites when it rains, storing it briefly and slowly releasing it so that it doesn't cause flooding and overwhelm stormwater systems.
Overflows	Overflows are caused by setting the high level of a float valve above the overflow outlet. Typical examples are in cooling tower sumps, hot water systems, swimming pools and water features.
Packing	Packing in a cooling tower breaks water into small drops so that there is a greater surface area for air contact.
Pre rinse spray valve	A handheld nozzle that uses a jet of water to remove food scraps from dishes before they are washed.
Soil compaction	With heavy regular use, soil particles are squashed. This stops the soil absorbing water and doesn't give turf roots space to grow.
Solenoid	Electro mechanical devices that activate a valve. They are used to shut off valves when water is not needed, for example – when a urinal does not need to flush.

Splash	The water that can be lost in cooling towers because of falling water in the tower, or strong winds blowing through the tower.
SUDF	Sewerage Usage Discharge Factor. SUDF is a measure of the ratio of water going out of your business through the sewerage system compared to water coming in from Sydney Water mains.
Thermal mass	The amount of time building materials take to gain or release heat. A building with a high thermal mass will be more energy efficient because internal temperatures will not swing with outside air temperatures.
Water Achiever®	A management diagnostic process that analyses qualitative or non-technical measures that businesses must address to achieve sound water management. Water Achiever® is designed for organisations with simple management structures.
WaterMark™	WaterMark™ certification shows that water supply, sewerage, plumbing and drainage goods meet quality standards.
WELS	Water Efficient Labelling and Standards scheme. WELS gives products a star rating based on their water efficiency. An overview of WELS ratings for taps, toilets, showers and urinals is shown in Chapter 11.

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